INDIA RUBBER WORLD

SYNTHETIC

OCTOBER, 1946

TECHNOLOGY DEPT.

Announcing . . .

STERLING 99

Now available in carload quantities, a carbon black made by the furnace process.

STERLING 99

Provides a new and unique combination of processing and reinforcement properties.

STERLING 99

Offers the rubber compounder a new tool in his attack on the problems arising out of the channel black shortage.

Samples and technical data on request.

CABOT

GODFREY L. CABOT, INC.

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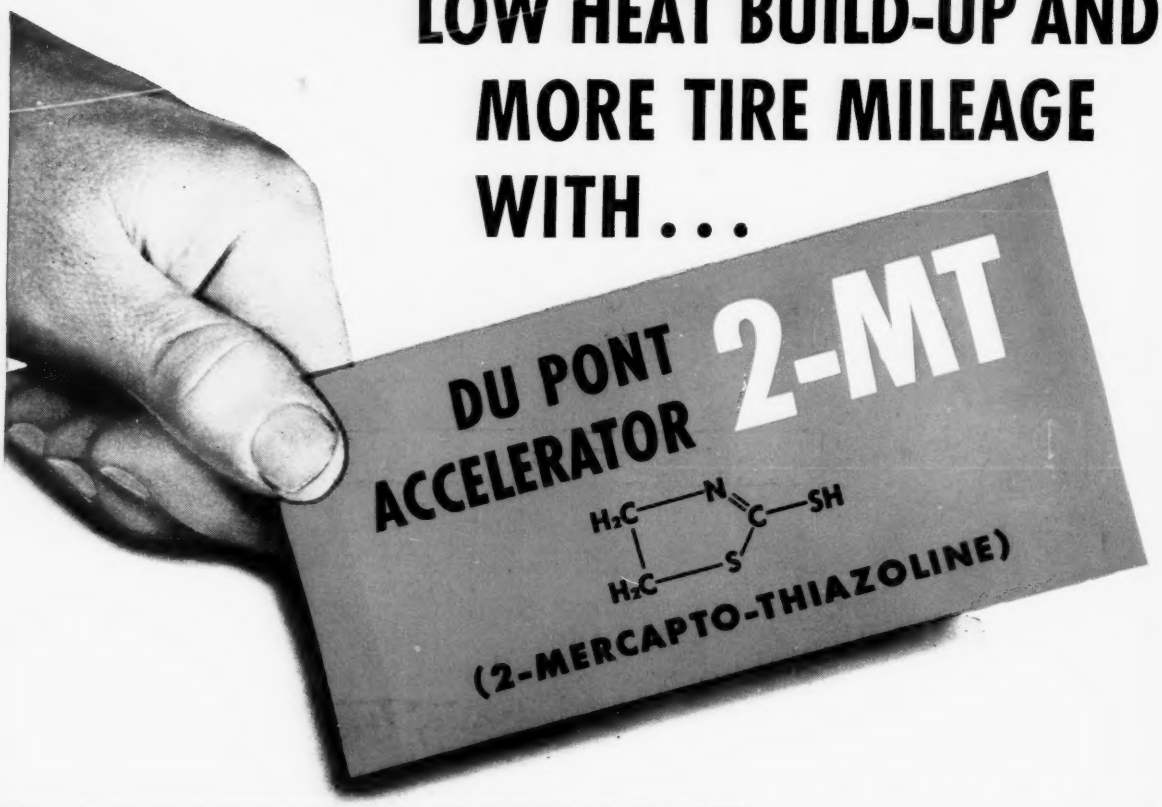
LOW HEAT BUILD-UP AND MORE TIRE MILEAGE WITH...



ADVANTAGES OF 2-MT OVER THIAZOLES AS SHOWN IN TIRE VULCANIZATES

Rubber stocks accelerated with 2-MT exhibit the following good qualities:

1. **Exceptionally low heat build-up.**
2. **Practically no tendency to revert and exhibit other undesirable effects of long curing.**
3. **Excellent resistance to heat and aging.**
4. **Extraordinary retention of tensile strength, extensibility and resistance to tear, at elevated temperatures.**
5. **Conspicuous resistance to flex cracking.**

Data accumulated from laboratory, plant and road tests prove beyond a doubt that the exceptional quality imparted by 2-MT to natural rubber compounds results in vastly improved truck tire performance. The outstanding advantages of 2-MT are the low heat build-up and the remarkable heat and age resistance that it imparts to stocks without resorting to low sulfur ratios. All of these plus values can be translated into higher mileage and longer life for your tires.

Accelerator 2-MT (thiazoline) shows advantages over MBT (thiazole) similar to those which the thiazoles provided over earlier types of accelerators.

The structural formula of 2-MT shown above reveals some relationship to mercapto benzo thiazole, but in its behavior the following favorable differences will be observed:

1. At vulcanizing temperatures below 267°F. its speed and strength are equal but at higher temperatures it is a slightly stronger and faster accelerator.
2. The modulus curve of stocks accelerated with straight 2-MT is slightly steeper. However, when the 2-MT is activated with a guanidine or an aldehyde amine, the modulus curve is flatter.
3. 2-MT is less acidic than MBT. Consequently it can be activated with guanidines or aldehyde amines with greater safety at processing temperatures.
4. Also because 2-MT is less acidic, the use of Retarder W or other organic acids such as stearic acid has greater retarding effect at processing temperatures. However, at vulcanizing temperatures (above 267°F.) this action is reversed and Retarder W activates acceleration.

Although rubber compounds having the most desirable physical qualities will be obtained by the use of 2-MT without secondary acceleration, activation with a guanidine or with an aldehyde amine such as Accelerator 808 results in faster cures.

Rubber Chemicals Division

E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Del.

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BETTER THINGS FOR BETTER LIVING
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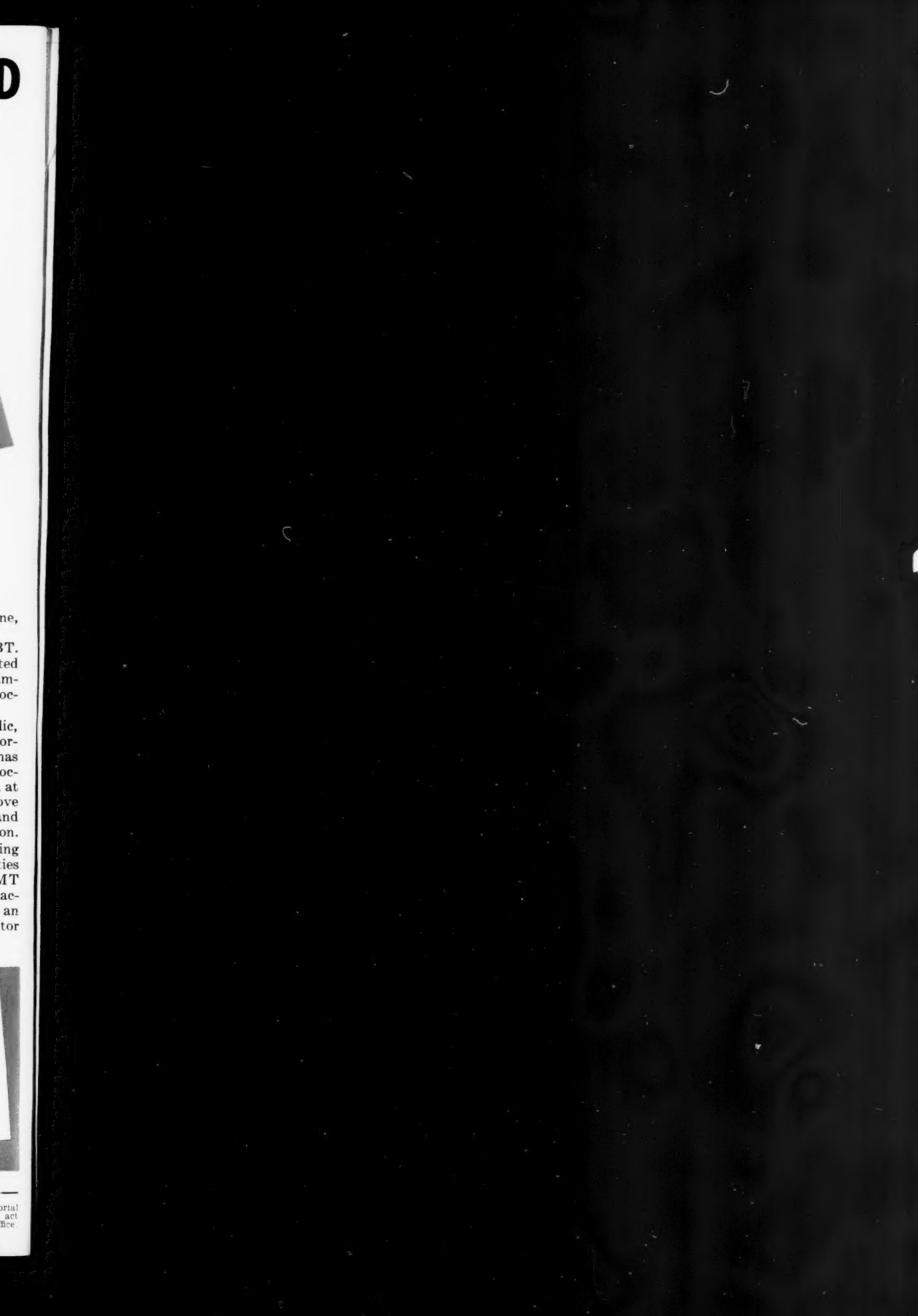

Fabric Uniformity Means Production Speed with Quality

Top production speed consistent with quality is always the watchword of rubber processors.

Mt. Vernon fabrics—better, tougher, more uniform than ever—are the answer to exacting production demands. Choice grades of cotton uniformly spun and woven into Mt. Vernon fabrics result in uniform absorption, strength, toughness and resiliency—easier, faster calendaring. For speed with quality—specify Mt. Vernon fabrics.

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a general purpose **ANTIOXIDANT** for natural rubber products, inner tubes, tire carcass, footwear, heels, soles, proofing, wire insulation and sundries. For natural rubber inner tubes use 1.5 parts to

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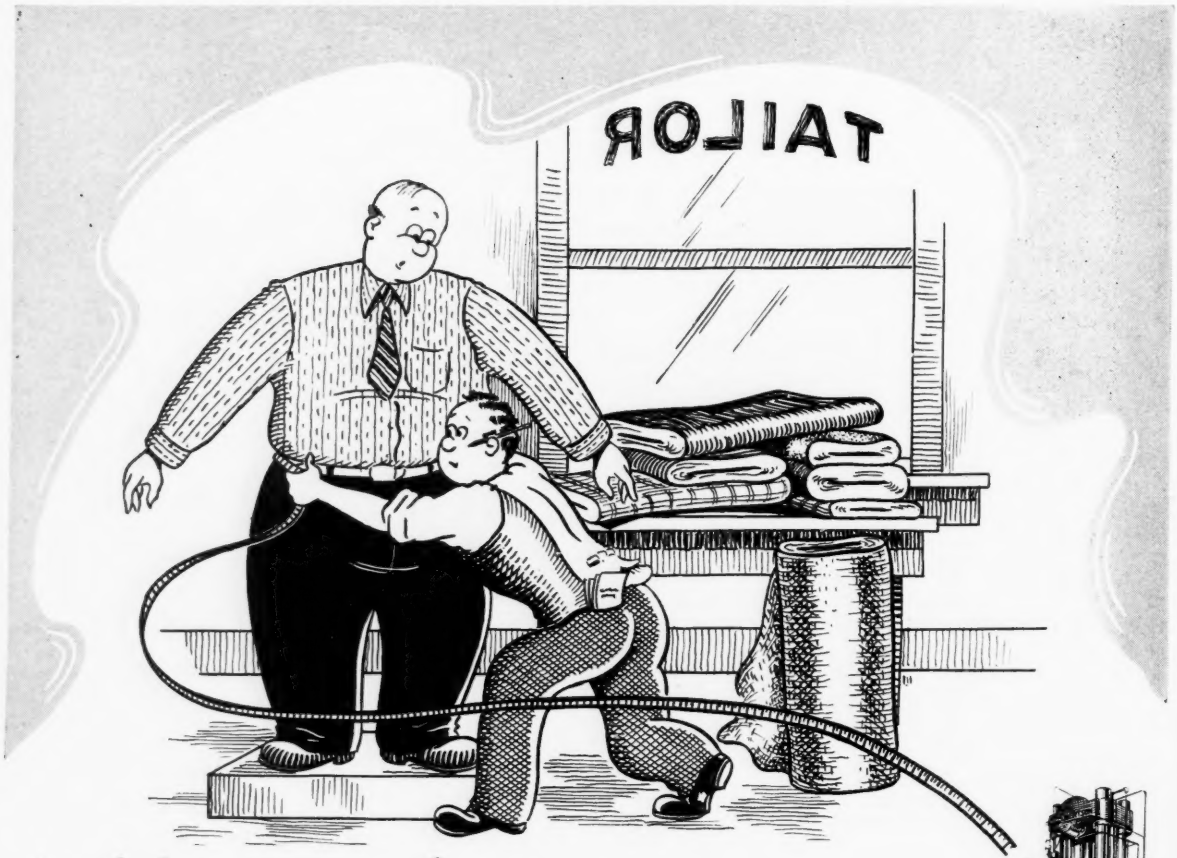

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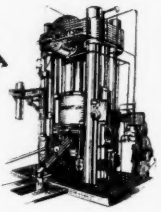
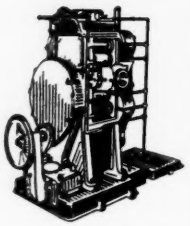
If you have any problem involving the maintenance, conversion, installation or repair of your encasing equipment, consult our engineering department. They'll be glad to help.

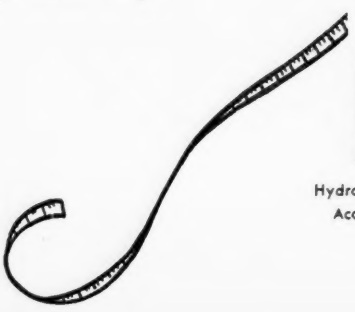


Hose Lead Encasing Press



Lead Sheath Stripping Machine

Hydro-Pneumatic Accumulator



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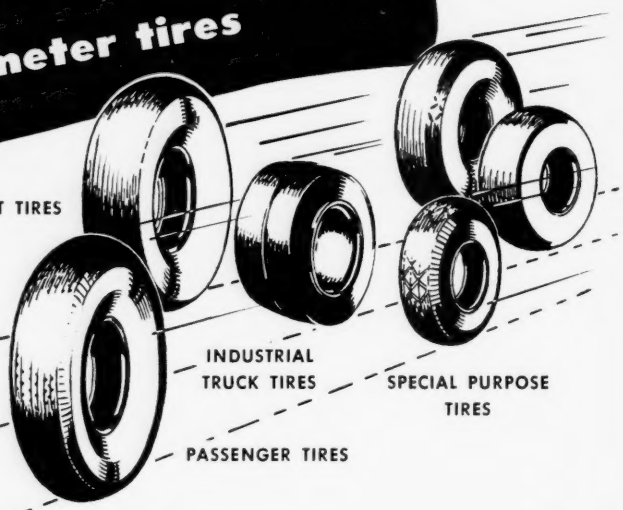
NEW MODEL NRM VACUUM EXPANDER for small diameter tires



MODEL 40 NRM VACUUM EXPANDER —Tire Size Capacity OD Max. 24", Rim Diameter size 4" to 12", stroke 17½" (cross section approx. 8" depending on rim diameter.) Hydraulic cylinder extends below floor level approx. 24".

THE trend is toward smaller diameter tires. Rim sizes for new passenger cars are to be still further reduced. Small planes, industrial trucks and other equipment are requiring an increasing volume of small tires with rim diameter sizes as small as 4".

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Compactly designed, the unit requires a floor area only 29" x 29", working surface is 32½ inches high for convenient operation.

Now is the time to check your production capacity on the smaller diameter tires, then if you find you are under-equipped to meet the fast-growing demands for these types of tires, write NRM for complete engineering data on this new Vacuum Expander Unit.

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AND

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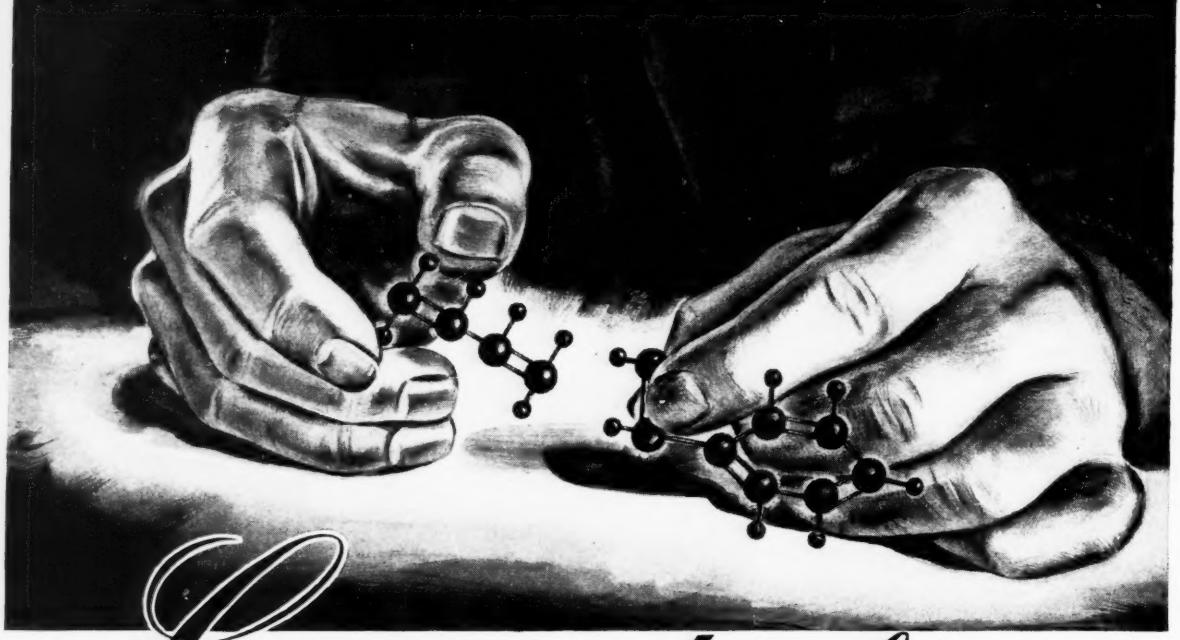

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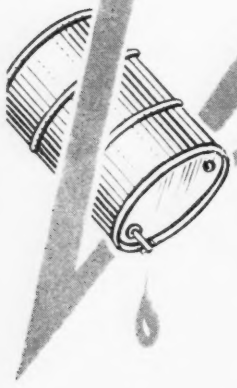

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. . . . or an extruding operation that needs speeding up of tubing for the flat pan cure or continuous running . . .

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. . . . when inner tubes are coated with GLYCERIZED, growth is reduced and modulus is maintained at high value with decidedly lower tensile depreciation under severe service. GLYCERIZED tends to minimize friction, permits slipping and placing into tire easily *(avoiding pinches)* with the added property of preservation and rich, satiny finish.

Glycerized is truly a Versatile Lubricant of unparalleled processing and finishing qualities for all types of synthetic rubbers as well as for natural rubber, reclaim or mixture thereof.

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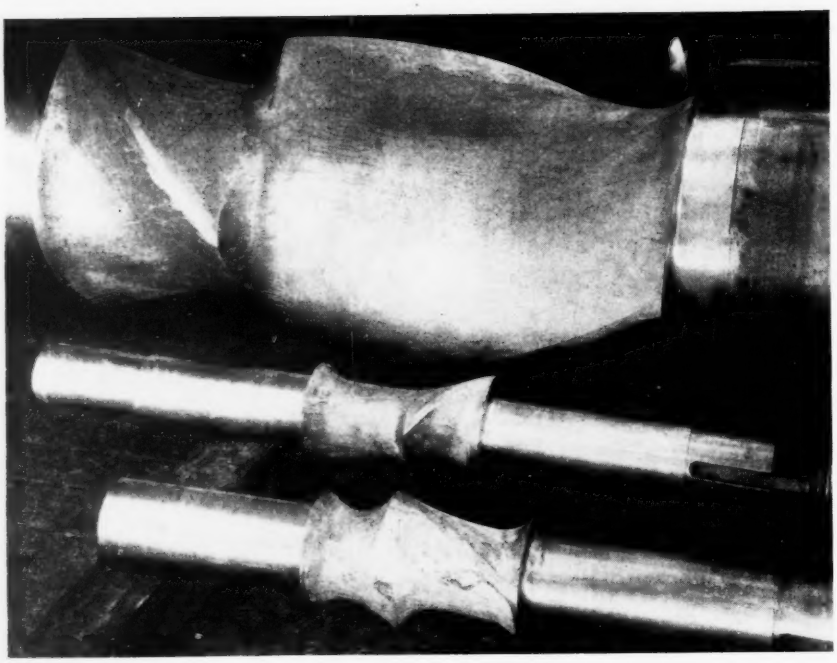

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And then — the best thing is to just call on us at INTERSTATE for expert rebuilding. Over more than a dozen years we have SPECIALIZED on Banbury work, and our facilities are unsurpassed.

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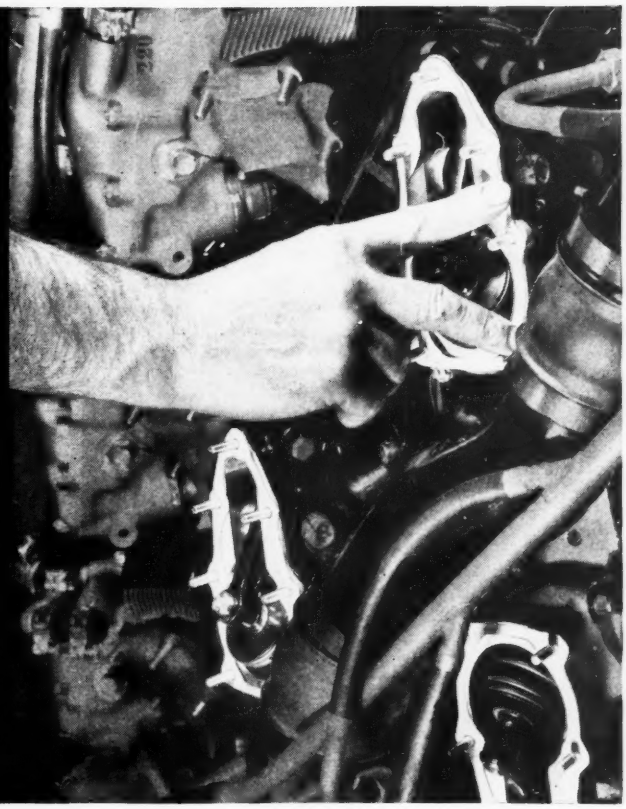


chosen best among all gasket materials tested for service at 450°F.

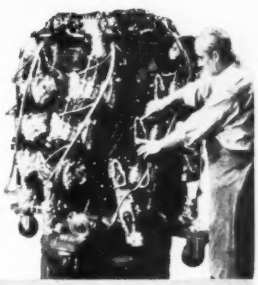
"NOTHING BUT THE BEST!" That's the policy followed by Pratt & Whitney in selecting materials for the powerful new 28-cylinder, 3650 h.p. Wasp Major.

That's why Silastic was chosen for these rocker box gaskets. Factors in the choice were Silastic's resiliency at the 450°F. operating temperature, resistance to the hot oil, and convenience in handling.

Silastic will fly with the Wasp Major in such giant new airliners as the Boeing Stratocruiser, Douglas Globemaster, Martin Mars, and Republic Rainbow.

If you need a rubber-like material that's resilient up to 500°F. and flexible down to −70°F., call for "Silastic Facts" No. 1A—and *TRY SILASTIC!*

*Trade Mark, Dow Corning Corporation



Silastic gaskets fabricated from Dow Corning silicone rubber by the Connecticut Hard Rubber Co. seal 56 rocker boxes of the 28-cylinder Pratt & Whitney Wasp Major.

DOW CORNING CORPORATION · MIDLAND, MICHIGAN

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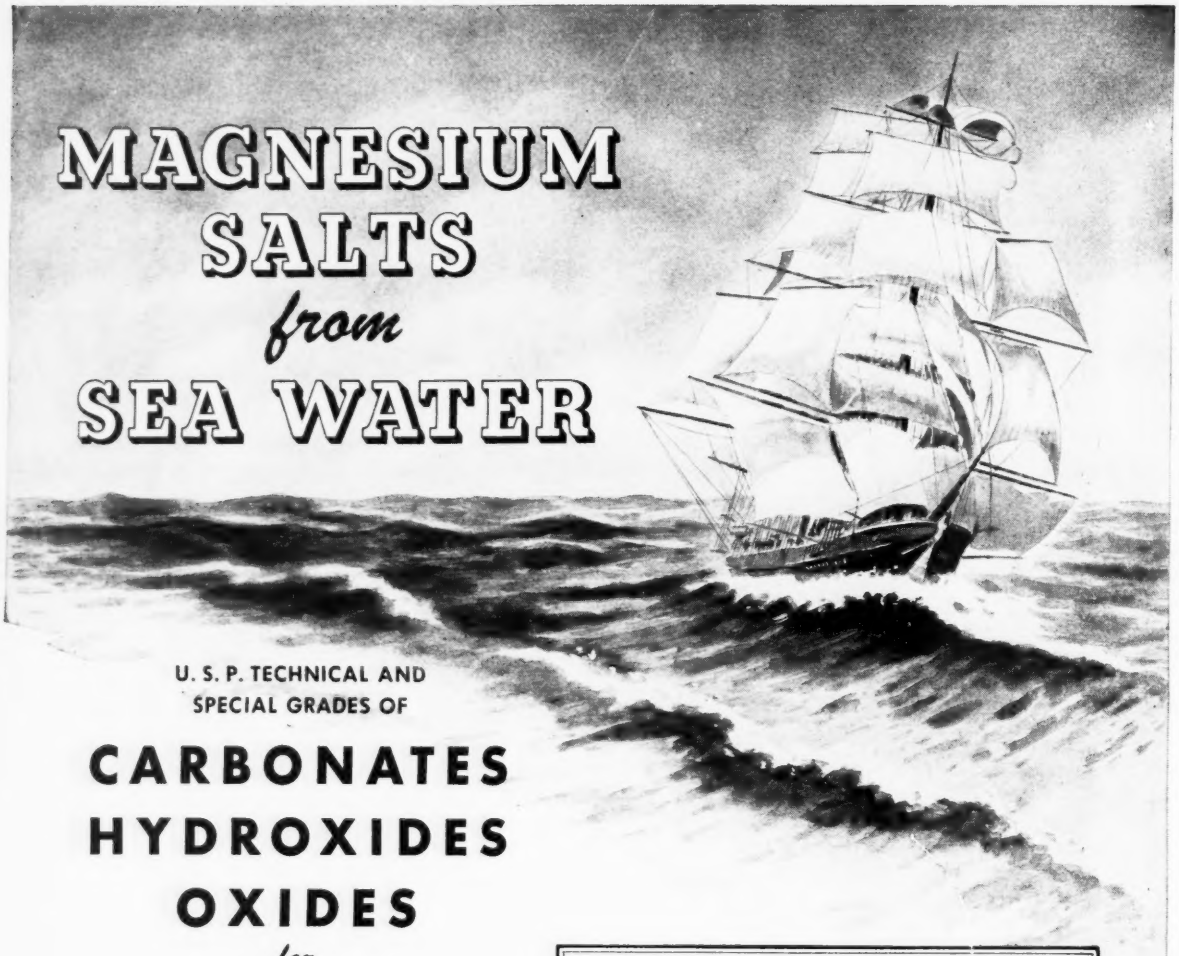

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When you consider natural rubber—GR-S—reclaim blends for mechanical goods—

consider . . .
INDONEX
plasticizers

BASE COMPOUNDS	A	B	C
Smoked Sheets	100		
GR-S		100	
Reclaim M-60			200
Gastex	25	25	10
Thermax	25	25	15
EPC Black	35	35	
ZnO	5	5	5
Stearic Acid	1	1	1
Sulfur	3	2	2
Benzothiazyl Disulfide	1	1.5	1
DPG		0.25	
INDONEX 639½	20	20	10
BLE	1	1	1
	216	215.75	245

Compounds A-B-C were blended to give the additional compounds shown below

RUBBER HYDROCARBON PROPORTIONS

	A	F	G	B	D	E	H	I	C
Smoked Sheets	100	50	25		50	25			
GR-S		50	75	100	25	50	50	25	
Reclaim					25	25	50	75	100

Original Tests—Average of 8 Cures at 316°

Modulus 200%	731	1106	1091	1082	903	922	632	449	472
Tensile	1922	2103	1938	1579	1888	1775	1344	976	638
% Elongation	466	410	387	375	438	407	450	445	373
Hardness	59	64	65	64	63	65	59	51	38
Tear	382	352	277	280	302	313	247	162	117

Oven Aged 70 Hrs. at 212° F. Average of 8 Cures

Modulus 200%	1460						1033	831	625
Tensile	1685	1792	1765	1731	1525	1566	1325	1118	717
% Elongation	250	187	185	176	213	209	265	284	240
Hardness	74	76	77	77	73	74	66	61	52
Tear	226	204	208	184	205	199	186	164	123

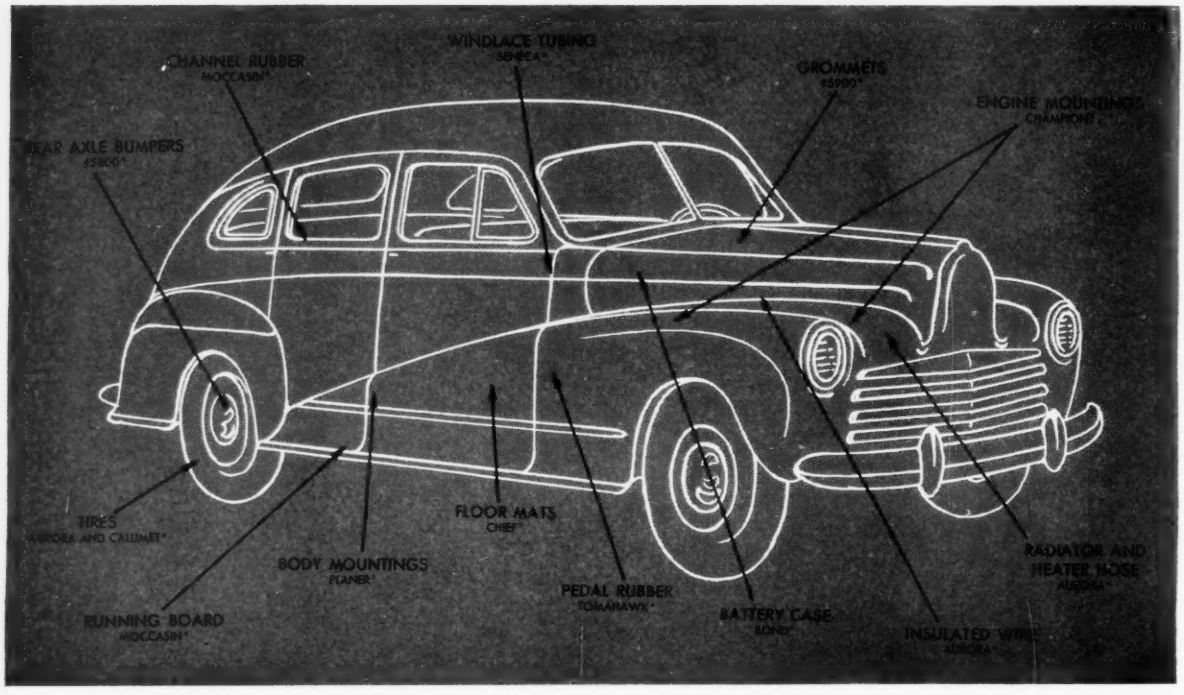
Compression Set 30% Deflection ASTM Method B

22 Hrs. 158° F.	32.4	21.4	20.5	23.8	26.8	24.6	35.6	39.8	41.6

For further information send for bulletin 13 & 13A

STANDARD OIL COMPANY (INDIANA)

Chemical Products Department, 910 S. Michigan Ave., Chicago 80, Ill.



Reclaimed Rubber Helped To Build Your Car!

Even rubber compounders are likely to underestimate the number of individual rubber parts used in the average automobile today. Only a few are shown—out of 200—or more.
Pequanoc reclaims are adapted to automotive needs which require:

1. Superior aging qualities.
2. Resistance to vibration fatigue.
3. Resistance to sunlight.
4. Scientifically controlled uniformity.
5. Price stability.

*We suggest PEQUANOC Reclaims as shown above—

PEQUANOC RUBBER CO.

QUALITY RECLAIMS FOR SPECIFIC PURPOSES

MAIN OFFICE and FACTORY
BUTLER, NEW JERSEY

New England Representative
HAROLD P. FULLER
203 Park Square Bldg.
Back Bay, Boston, Mass.

European Representatives
BURNETT & CO. (London) Ltd.
46 Herga Court
Harrow-On-Hill, Middlesex, England

RUBBER CHEMICALS

manufactured by SHARPLES CHEMICALS Inc.

Over 70 Synthetic Organic Chemicals are manufactured commercially by Sharples. Of these, the products listed below are of special interest to the Rubber Industry:—

Vulcanizing Agents

*VULTAC No. 1 (alkylphenol sulfide)
*VULTAC No. 2 (alkylphenol sulfide)
*VULTAC No. 3 (alkylphenol disulfide)

Polymerization Controller

*3B MERCAPTAN (tertiary dodecyl mercaptan)

Solvents

DICHLORO PENTANES
MIXED AMYL CHLORIDES

* Sharples Registered Tradename

Intermediates for Synthesis of Rubber Chemicals

MONOETHYLAMINE
DIETHYLAMINE
TRIETHYLAMINE
MONOBUTYLAMINE
TRIBUTYLAMINE
DIETHYLAMINOETHANOL
DIBUTYLAMINOETHANOL
ETHYLETHANOLAMINES
DIBUTYLAMINE

Plasticizer

DIAMYLPHENOL

Further information relating to the above products, together with samples, will be supplied promptly upon request.

VULCANIZATION ACCELERATORS †

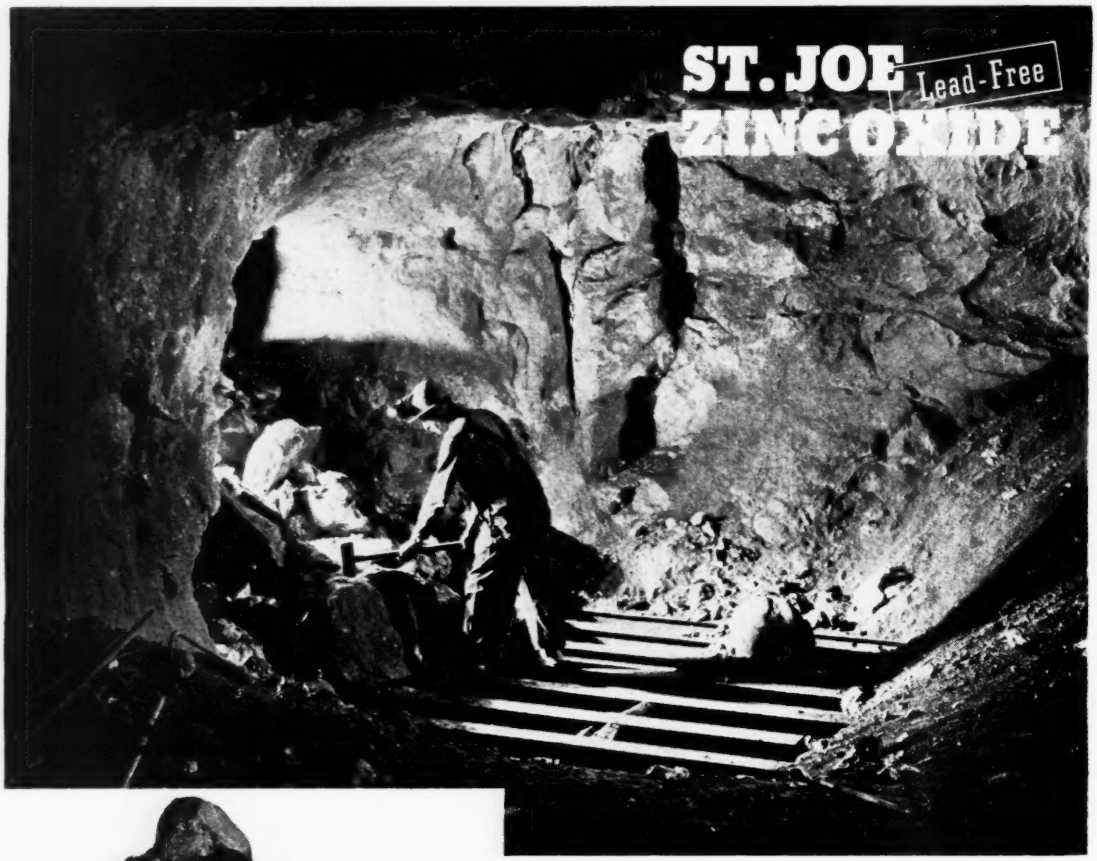
Chemical Names	Tradenames of R. T. Vanderbilt Co.
Tetraethylthiuram Disulfide	Ethyl Tuads
Tetramethylthiuram Disulfide	Methyl Tuads
Cupric Diethyldithiocarbamate	Cumate
Selenium Diethyldithiocarbmate	Selenac
Zinc Dibutyldithiocarbamate	Butyl Zimate
Zinc Diethyldithiocarbamate	Ethyl Zimate
Zinc Dimethyldithiocarbamate	Methyl Zimate

† These vulcanization accelerators are manufactured by Sharples. They are sold exclusively by the R. T. Vanderbilt Co., 230 Park Ave., New York City, to whom all inquiries are to be addressed.

SHARPLES TRADE MARK CHEMICALS

SHARPLES CHEMICALS Inc. PHILADELPHIA • CHICAGO • NEW YORK

In the Balmat zinc mine of the St. Joseph Lead Company the broken ore is screened by a steel "grizzly." The "grizzly" is the first screening operation. The broken ore drops between the steel beams and falls into the underground ore chute.



Speaking of particle size —

Shown here in the St. Joseph Lead Company's zinc mine at Balmat, N. Y., is the first screening operation in the intricate process which converts these large boulders of ore into St. Joe Zinc Oxide. This reduction of huge ore boulders into high-purity lead-free zinc oxides of the finest particle size is indeed a modern miracle of metallurgical precision and efficiency.

The Electrothermic Process employed in this Company's zinc oxide plant at Josephtown, Pa., is patented and used by the St. Joseph Lead Company exclusively in this country. Its flexibility makes it possible to control the purity and the size and shape of oxide particles to a degree which has made the various grades of St. Joe lead-free Zinc Oxides justly famous for their consistent uniformity.

ST. JOSEPH LEAD COMPANY

250 PARK AVENUE • NEW YORK 17 • ELdorado 5-3200

Plant & Laboratory: Josephtown, Beaver County, Pennsylvania

SCIENCE

brings

SAFER
LONGER WEARING
COOLER RUNNING
EASIER RIDING

RAYON CORD TIRES

One of the most amazing developments that came out of the war was Rayon Cord for Tires. It kept our armed forces rolling to victory—now it is performing new miracles in the civilian tires of motoring America.

What are the advantages?

Rayon licks the worst enemy of tires —HEAT. Rayon cord tires run cooler and the cord maintains higher tensile strength as temperature rises. Result—big tire users—Army, bus and truck fleet operators—agree blowouts and road failures are greatly reduced; mileage is considerably increased, with rayon cord tires.

Another thing, rayon cord is stronger per unit of weight and for that reason a rayon tire requires less rubber and less cord. Therefore, it's a lighter tire, flexes easier, and offers less rolling resistance. That means a more comfortable ride and an actual saving in gas consumed.

Tyron, Industrial Rayon's tire cord, in addition to the characteristics it holds in common with all tire rayon, is made by our exclusive Continuous Process. This assures tire makers of the highest degree of uniformity throughout a single tire or any number of tires—and that's what counts in "the long run."

The complete story of Rayon for Tires is in

"ROLLING ON RAYON"

a FREE booklet—important reading for every man who makes, distributes, sells or uses tires. Write Dept. F, Industrial Rayon Corp., 500 Fifth Avenue, N. Y. 18, N. Y.

***TYRON** REG. U. S. PAT. OFF.

rayon for tires

Made by INDUSTRIAL RAYON CORPORATION
Cleveland, Ohio

A WIDE RANGE OF USEFULNESS

A Plasticized Petroleum Wax To Promote Efficiencies In Processing

CHARACTERISTICS

Physical appearance	—Semi-Solid
Melting point	—125° F.
Specific gravity	—.96
Color	—Gray
Solubility	—in most solvents

HERCO WAX is a scientific blend of petroleum oil and petroleum wax designed as a processing aid at low material cost. It is a two-in-one material streamlined to carry out one of the oldest compounding functions with a very definite added convenience.

RUBBER H AND M PIGMENTS Chemicals

RECOMMENDED ADVANTAGES

1. Aids in mixing
2. Improves calendering
3. Smoother and faster extruding
4. Aids mold flow of compound
5. Lubricates molds
6. Minimizes mold c'eaning
7. Does not bloom when used in normal dosage (1 to 3 parts on elastomer)
8. Available
9. Low cost

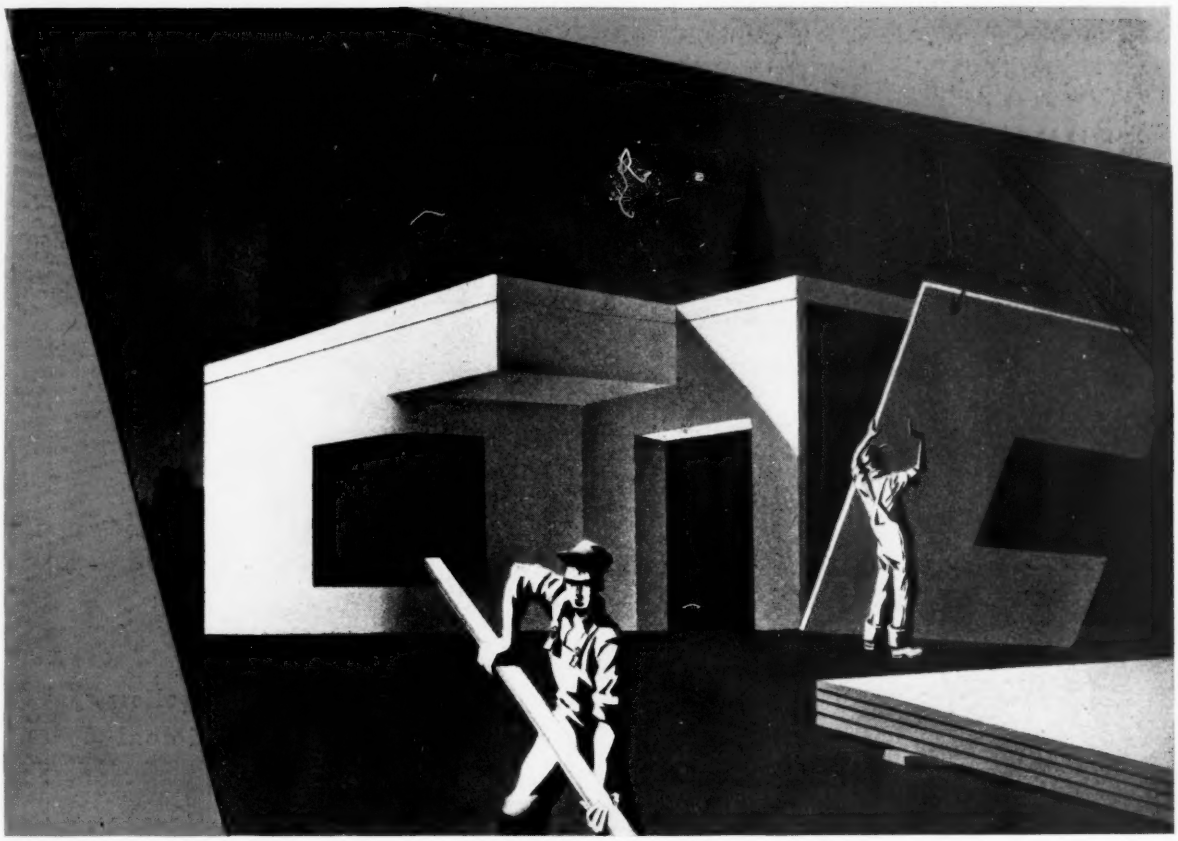
For samples and compounding information on softening oils and waxes please write to Herron Bros. & Meyer—Our Technical Representative will be glad to call on you.

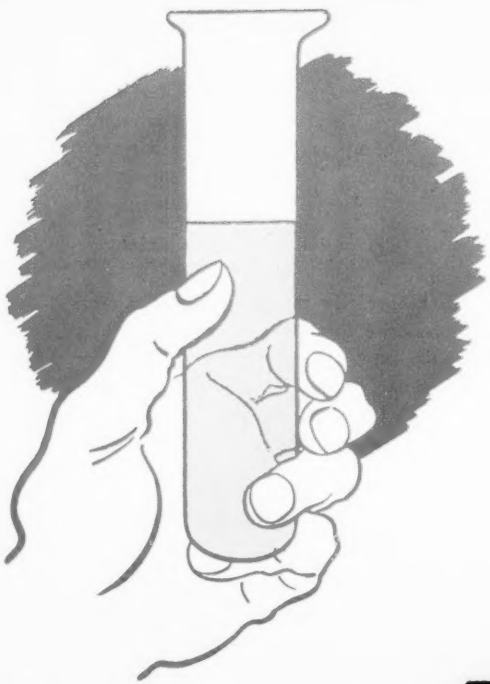
HERRON BROS. & MEYER

82 BEAVER ST., NEW YORK 5, N. Y.

516 OHIO BUILDING, AKRON, OHIO

SUPPLIERS OF RUBBER CHEMICALS



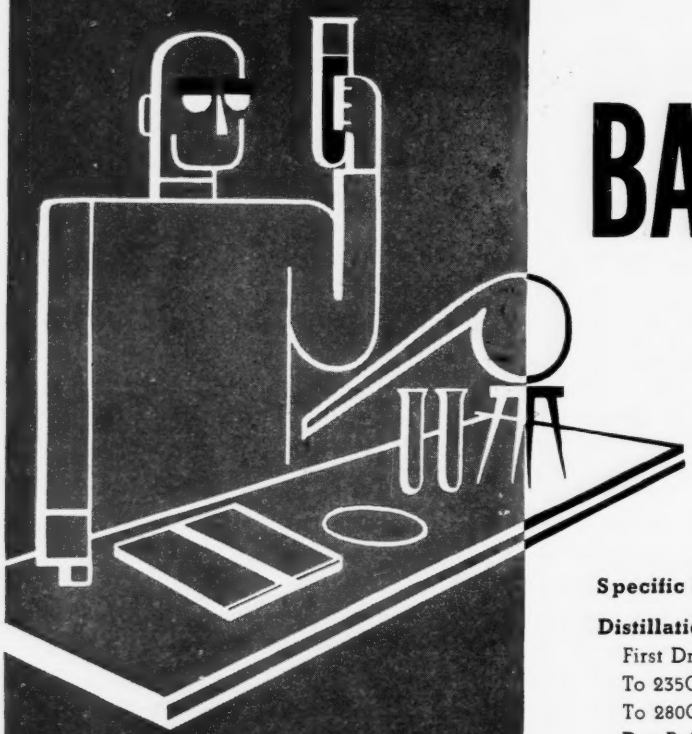


PRE-FABRICATED WILL MEAN PRE-FINISHED

..... and the chances are that any factory applied finish will be a Stanley formula . . . made specifically to the manufacturers requirements. Putting the "finishing touches" on a product, any product, is our business. Perhaps our specialized knowledge, born of experience in dealing with practically every branch of industry, will help solve your finishing problem. Inquiries incur no obligation. Write to Stanley Chemical Company, East Berlin, Connecticut, manufacturers of Stanley Enamels, Synthetics, Lacquers and Japans.

Stanley Chemical

FROM THE CATALOG OF BARRETT RUBBER COMPOUNDING MATERIALS...



BARDOL* B

Bardol B is a clear, yellow liquid product of coal-tar oil.

SPECIFICATIONS

Specific Gravity	@ 25°C 25°C	1.00 to 1.04
Distillation		
First Drop	Deg. Cent.	230.0 minimum
To 235C	% by volume	5.0 maximum
To 280C	"	90.0 minimum
Dry Point	Deg. Cent.	310.0 maximum
Water	% by volume	0.2 maximum

Bardol B is a specially refined coal-tar fraction designed primarily for light-colored goods. It is a particularly fine plasticizing oil. Bardol B is recommended for use with crude rubber, GR-S, GR-A(Buna N), GR-M(Neoprene), GR-P(Thickol) and for reclaiming light-colored goods.

Available in: 50-55 gal. non-returnable steel barrels.

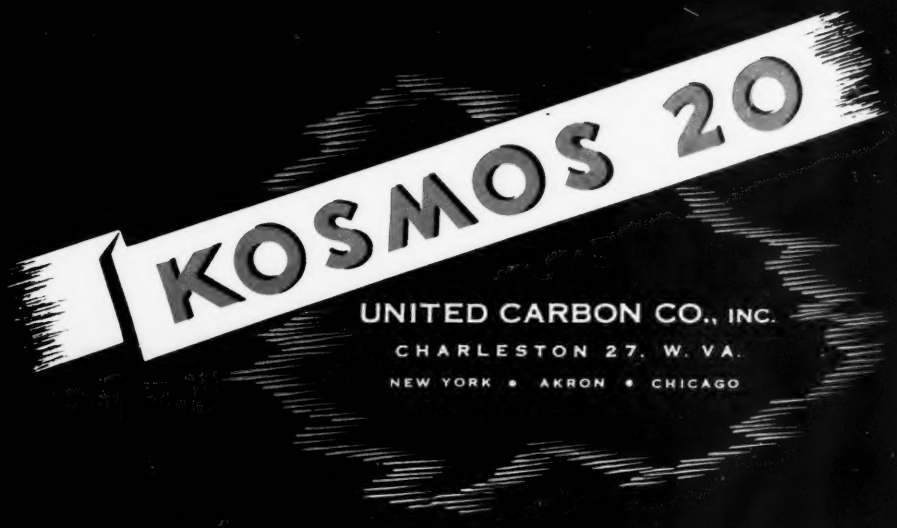
*Reg. U.S. Pat. Off.

Barrett

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

In Canada: The Barrett Company, Ltd.,
5551 St. Hubert Street, Montreal, Que.

RLD


KOSMOS 20
UNITED CARBON CO., INC.
CHARLESTON 27, W. VA.
NEW YORK • AKRON • CHICAGO

KOSMOS 20

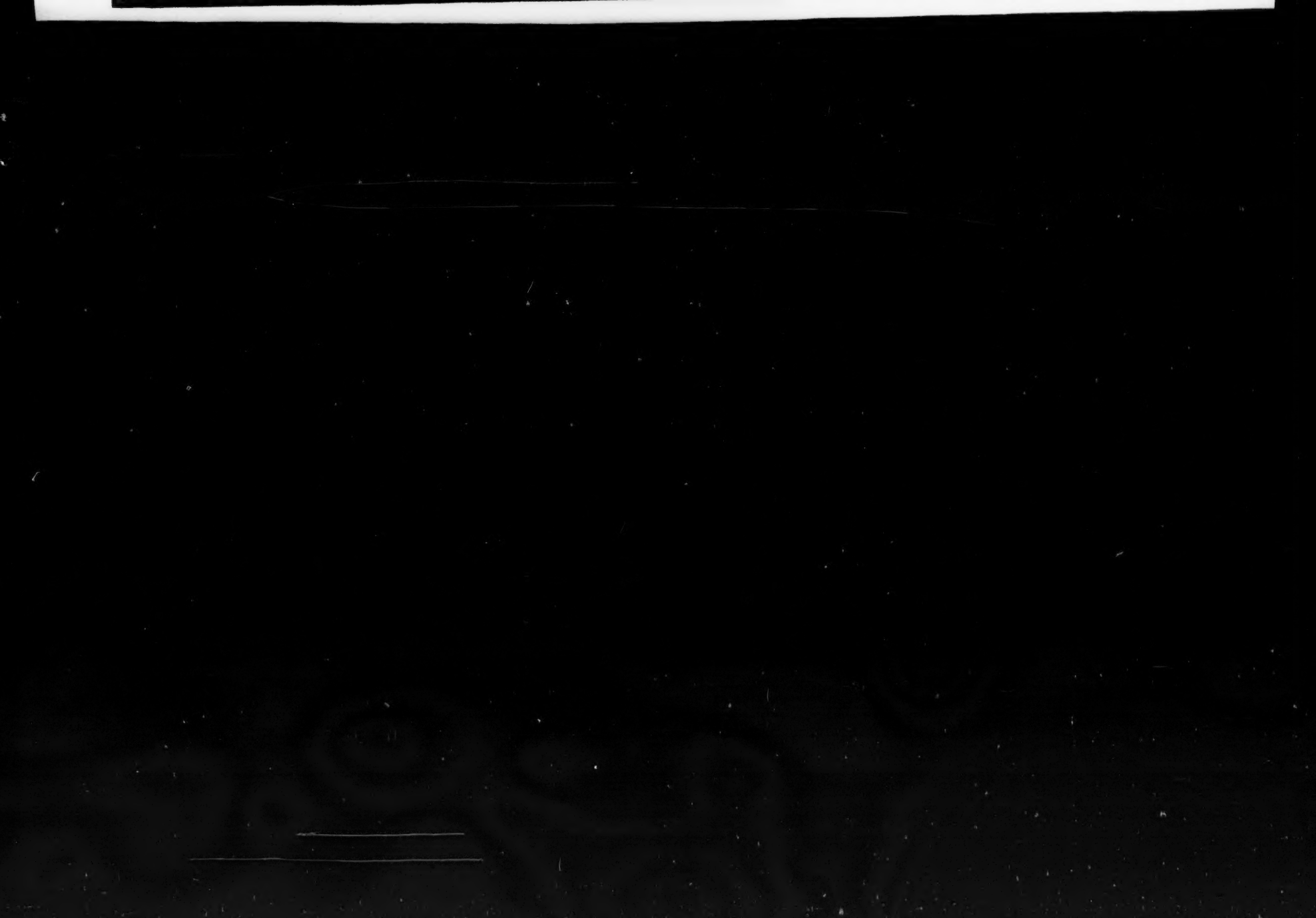
In SRF black there should be a perfect balancing of all the component properties contributing to rubber performance. UNITED with the "know-how" and engineering skill have achieved this perfect balance in KOSMOS 20. With it you obtain ease and smoothness of processing, the proper degree of semi-reinforcement, low heat generation, maximum resiliency, best aging and non-staining.

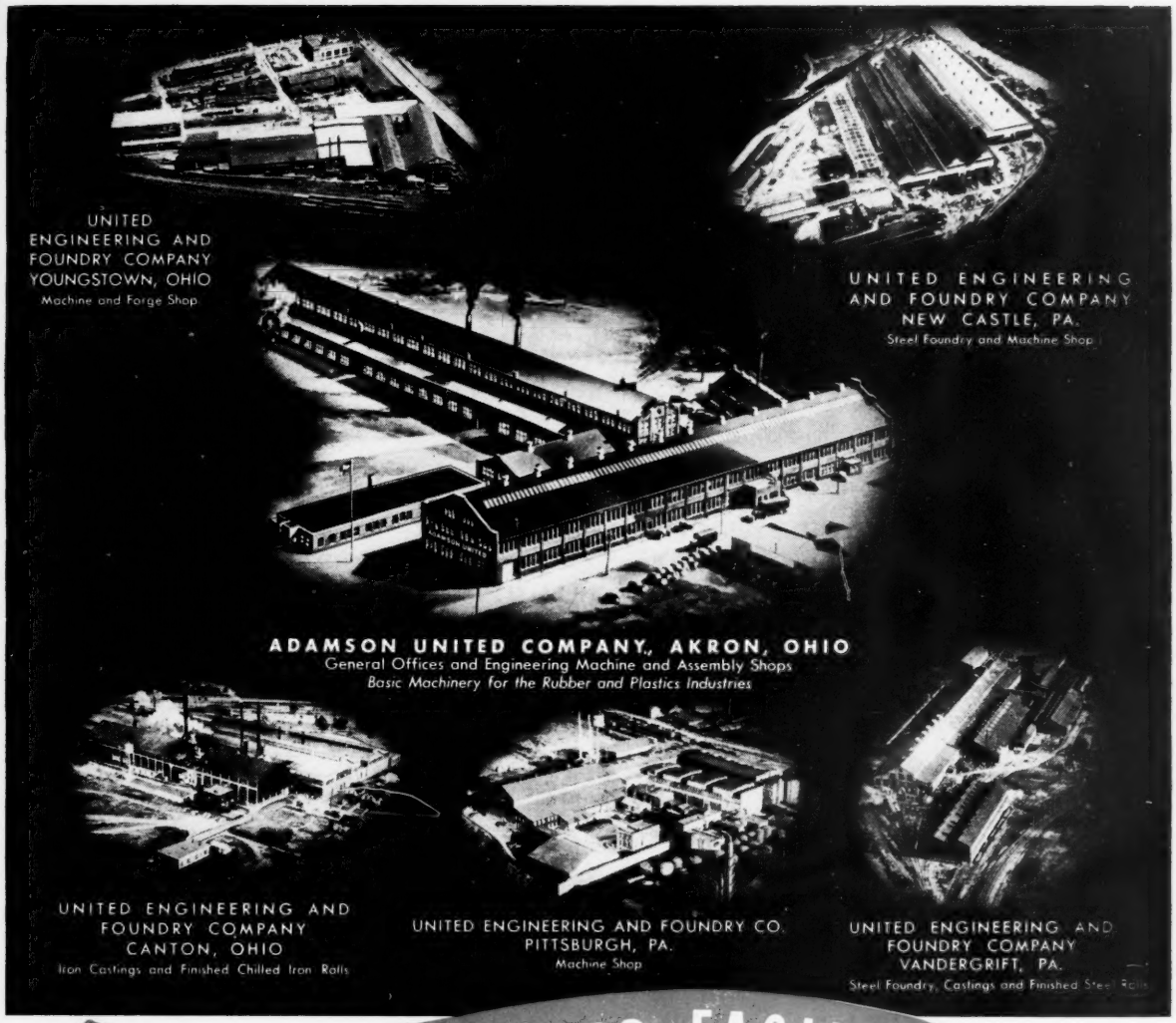
The wise compounder insists
on KOSMOS 20.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston 27, West Virginia





ADAMSON UNITED FACILITIES

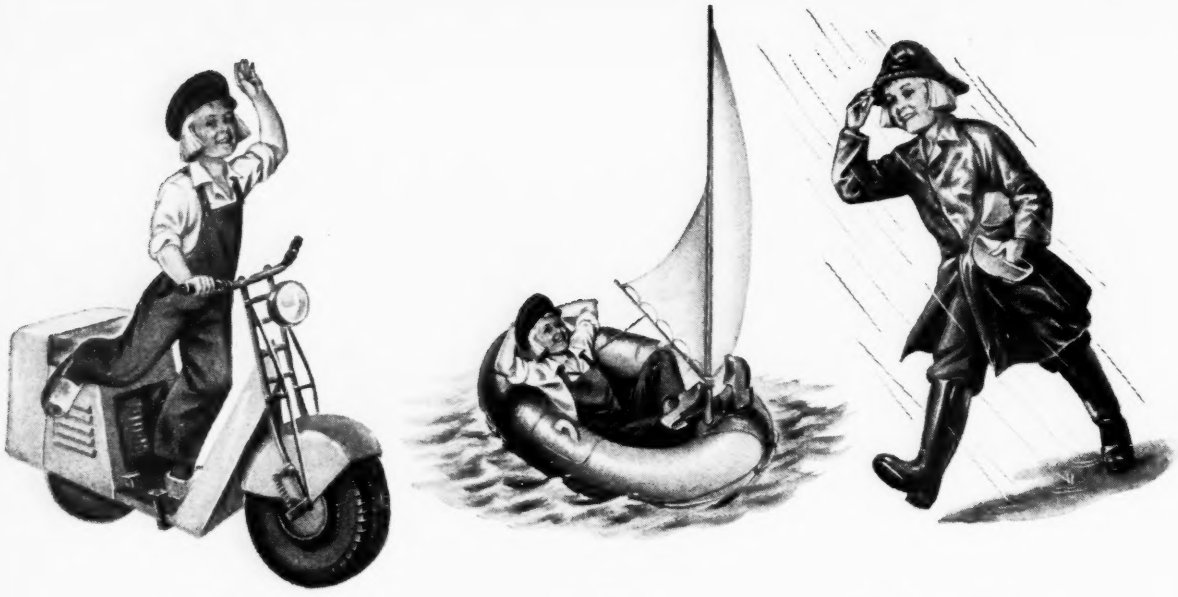
In addition to the productive capacity of 6 great manufacturing plants, we offer you the combined resources and abilities of two competent engineering organizations and over 54 years experience and research in the design and creation of basic processes and machinery for the rubber, plastics and plywood industries.

If your plans include the installation of additional equipment, or the creation of new processes for unusual product requirements, consult us. Our engineers will gladly cooperate with you on all your technical problems.

ADAMSON UNITED COMPANY
730 CARROLL STREET · AKRON (4), OHIO
SUBSIDIARY OF UNITED ENGINEERING AND FOUNDRY CO.
Plants at: PITTSBURGH · VANDERGRIFT · NEW CASTLE · YOUNGSTOWN · CANTON

PRODUCTS MANUFACTURED BY ADAMSON UNITED

- Mills
- Crackers
- Washers
- Large Molds
- Pot Heaters
- Vulcanizers
- Autoclaves
- Hydraulic Presses
- Multi-Platen Presses
- Automatic Curing Presses
- Belt Curing Presses
- Compression Molding Presses
- Plywood Presses
- Auxiliary Equipment
- Refiners
- Mixers
- Calenders



For Tires... or Boats... or Rainproof Coats...

"If it's made with RUBBER ...it's better made with RED LEAD"

In almost every field...tires or soles or plugs for bowls ...*if it's made with Rubber, Red Lead will make it better.*

Manufacturing experience has emphatically confirmed our earlier tests, and established that compounding rubber with #2 RM Red Lead gives the worthwhile benefits listed at the left.

If you make tires, *all seven* advantages are yours, while *most* of them apply with other products, too... regardless of whether you're working with GR-S, GR-S-10, GR-M, GR-A, GR-I, natural rubber or vinyl elastomers.

Technical literature and counsel on your specific application will be supplied upon request to the Rubber Division of our Research Laboratories, 105 York Street, Brooklyn 1, N.Y.

CHECK THESE REASONS FOR COMPOUNDING RUBBER WITH #2 RM RED LEAD

1. Improved Heat Stability—Retention of Elasticity
2. Lower Heat Build-up—Cooler Running
3. Economical
4. Faster Curing Rate
5. Extended Curing Range
6. Excellent General Physical Properties
7. Safe Processing

NATIONAL LEAD COMPANY

New York 6; Buffalo 3; Chicago 8; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6; (National Lead Co. of Mass.) Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W.Va., (Evans Lead Division).

For Quality Solvents, Industry looks to Esso!

Esso Petroleum Solvents are applied to hundreds of uses in modern industries... one of the many grades will serve you, whatever your requirements. Continuing product control assures you of constant uniformity and suitability when using Esso Solvents... behind them stand the nation's largest petroleum research laboratories. When next ordering solvents remember the Esso name... for downright dependability you can't beat it!

STANDARD OIL COMPANY OF NEW JERSEY
Elizabeth, N. J.—Baltimore, Md.—Richmond, Va.—Charleston, West Va.—Charlotte, N. C.—Columbia, S. C.—New Orleans, La.—Little Rock, Ark.—Memphis, Tenn.

STANDARD OIL COMPANY OF PENNSYLVANIA
Philadelphia, Pa.

COLONIAL BEACON OIL COMPANY
Boston, Mass.—New York, N. Y.

Technical Bulletin No. 26 — on the Compounding of GR-S with Substantial Loadings of Zinc Oxide

Further Studies with Superaging GR-S Compounds

ORIGINAL RESULTS

Time of Cure Min. at 310° F.	Tensile Strength (psi)	Per Cent Elongation	Modulus—Load (psi) for Elongation of:				Permanent Set	Shore Hardness
			200%	300%	400%	500%		
2	1925	830	150	225	340	450	.75	46
4	1920	725	195	275	390	590	.59	48
7.5	1940	675	235	310	465	700	.50	49
15	1920	600	240	360	560	840	.41	50
30	1900	590	270	390	580	890	.35	52
45	1640	575	265	380	610	950	.32	52
60	1485	555	265	380	570	990	.28	51
90	1425	550	240	355	555	950	.27	51

AFTER 20-HOUR AIR PRESSURE HEAT TEST*

Time of Cure Min. at 310° F.	Tensile Strength (psi)	Per Cent Elongation	Modulus—Load (psi) for Elongation of:					Permanent Set
			100%	200%	300%	400%	500%	
2	1310	470	425	540	690	960	...	.42
4	1360	495	440	560	680	960	...	.45
7.5	1310	480	435	595	750	910	...	.46
15	1400	495	440	600	760	1000	...	.51
30	1335	480	470	625	785	1020	...	.45
45	1370	485	470	625	745	1020	...	.45
60	1280	480	465	620	775	1010	...	.42
90	1320	495	520	680	800	1040	...	.44

* Test Conditions: 260° F., 80 lb. Air Pressure.

A PREVIOUS Technical Bulletin (No. 21) featured a sulfurless compound satisfying the requirements of A.S.T.M. Standard Specification D754-43T after aging 20 hours in the Air Pressure Heat Test at 126° C. and 80 lbs. air pressure.

The study is continued and higher tensiles are realized with a lower cost compound than with that previously reported. Aged tensiles exhibit the desirable plateau effect and aged elongation is well preserved over the entire curing range—in fact, there are indications of a tendency toward reversion. This compound also meets A.S.T.M. Standard Specification D754-43T.

COMPOUND NO. 26

GR-S	100.0
Sulfur	1.5
Zenite	1.75
Thionex	0.5
DPG	0.5
Sublimed Litharge	5.0
Coumarone-indene Resin	15.0
Mineral Rubber	10.0
Akroflex C	2.0
Heliozone	4.0
Stearic Acid	1.0
Calcene	75.0
Suprex Clay	25.0
Zinc Oxide	50.0

Uniform Quality HORSE HEAD ZINC OXIDES

HORSE HEAD PRODUCTS New Jersey zinc

THE NEW JERSEY ZINC COMPANY
160 FRONT STREET • NEW YORK 7, N. Y.
Products Distributed by THE NEW JERSEY ZINC SALES COMPANY
NEW YORK • CHICAGO • BOSTON • CLEVELAND • SAN FRANCISCO

color makes appeal

NATURE takes no chance on the perpetuation of its flowers. . . . A black poppy would have no appeal for the bees who are needed to pollinate and make possible its reproduction. . . . So it is with countless products today whose drab appearance falls short in the appeal needed to stimulate and reproduce sales. . . . The return of COLOR to Drug Sundries, Mechanical Goods, Footwear, Inner Tubes, White Sidewall Tires, is an encouraging production trend which is being aided materially by SILENE EF. This white reinforcing pigment is assuring greater success in color compounding. . . . It is essential in many non-black compounds of natural or synthetic rubber to give them the needed processing and good cured physical properties.

Our laboratory is at your service to aid in the compounding of materials for any production need. If we can help, write direct or call on any of our branch offices.

SILENE EF

A Product of Pittsburgh Plate Glass Company

Trade Mark Registered U. S. Patent Office

STANDARD Chemical Company

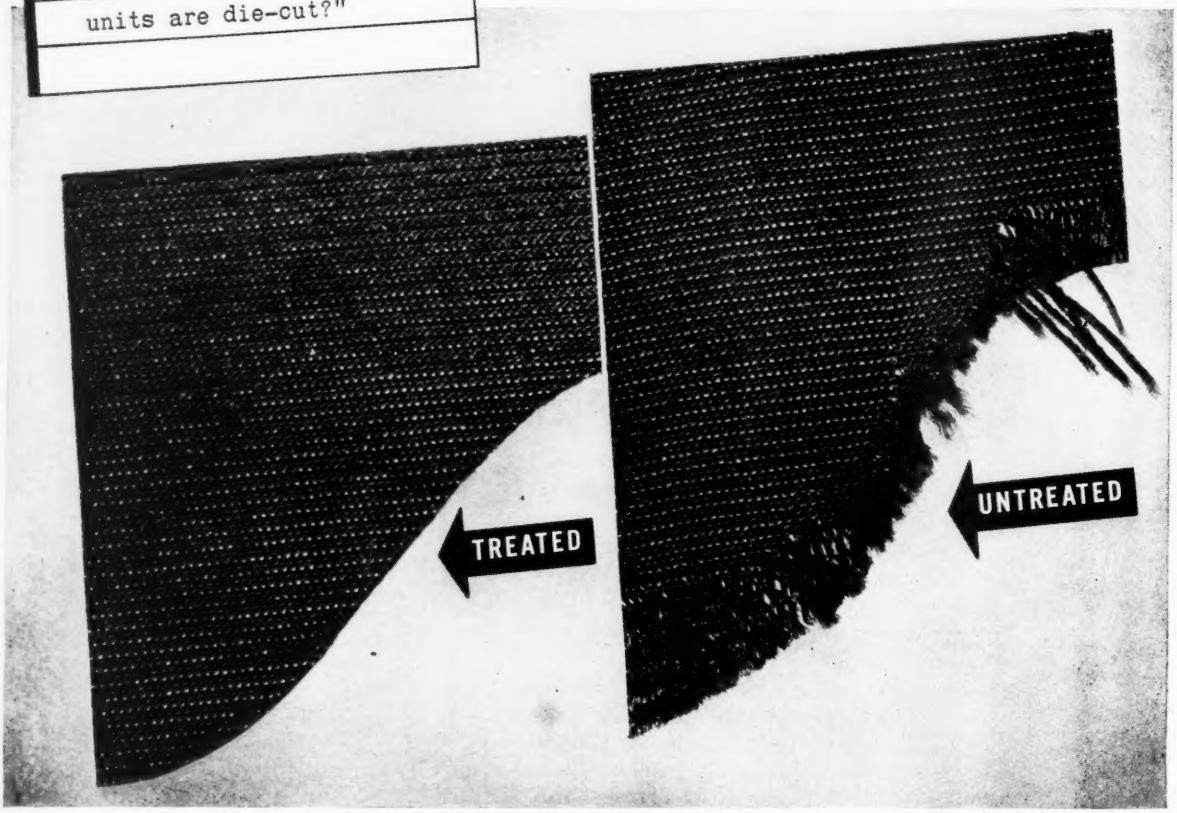
General Offices: AKRON 8, OHIO

New England: 335 Chamber of Commerce Bldg., Boston, Mass.
Mid-Atlantic: Broad Street Bank Bldg., Trenton, N. J.
Mid-West: 2724 W. Lawrence Ave., Chicago, Ill.
Pacific Coast: 1248 Wholesale St., Los Angeles, Cal.

CUSTOMER PROBLEM No.217

"Can you provide a coating compound to prevent fraying of fabrics when units are die-cut?"

We did...with UBATEX



UBS LAST MINUTE BULLETIN

NE-100

UBS now offers for immediate delivery Type #571 Neoprene Latex, concentrated by evaporation method to 59 % ± 1% solids.

Ubatex, used as a fabric coating, permits die-cutting of irregular fabric units for shoes, pocketbooks and similar products without fraying; leaves all edges clean-cut. A latex-like emulsion of plasticized polystyrene, Ubatex is applied by conventional coating machines, gives a flexible, supple film. It in no way affects the "hand" of the original fabric, and having a dry surface, presents no blocking problems in multiple cutting or packing. UBS may have the answer to your coating problem.

Address all inquiries to the Union Bay State Chemical Company, Rubber Chemicals Division, 50 Harvard St., Cambridge 42, Massachusetts.

UBS

UNION BAY STATE
Chemical Company

Serving Industry with Creative Chemistry

ORGANIC CHEMICALS · SYNTHETIC LATEX · SYNTHETIC RUBBER
PLASTICS · INDUSTRIAL ADHESIVES · DISPERSIONS
COATING COMPOUNDS · IMPREGNATING MATERIALS · COMBINING CEMENTS

SANTOCURE

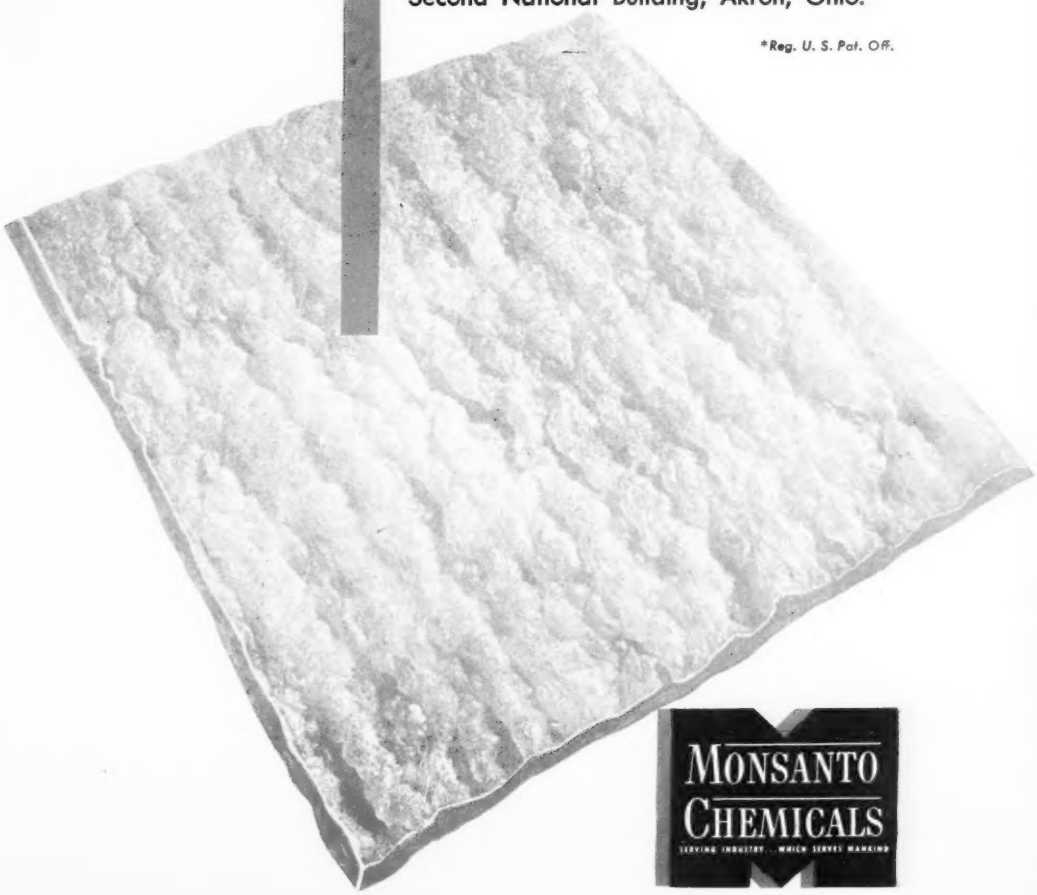
accelerator for rubber vulcanization

excellent in natural rubber

The superior performance of Santocure* in synthetic rubber, and its wide use throughout the war years, may have obscured the fact that Santocure does the same excellent job of curing natural rubber. Through the choice of secondary accelerators, you can get optimum cures of rubber stocks under practically all plant conditions . . . Santocure also performs well in black stocks.

Available to everyone interested in accelerators and antioxidants are . . . (1) Continuing research studies on many rubber products, and . . . (2) Literature describing the properties and applications of Santocure. Write MONSANTO CHEMICAL COMPANY, Rubber Service Department, Second National Building, Akron, Ohio.

*Reg. U. S. Pat. Off.



MONSANTO CHEMICALS
SERVING INDUSTRY . . . WHICH SERVES MANKIND

None Remains in the Bag—

Free-flowing PELLETEX is economical as well as convenient. You get the use of every particle.

And, you get much more. As pioneers and leaders for 18 years in the production of semi-reinforcing furnace blacks, General Atlas has developed a technique born of this experience that insures a uniform, thoroughly dependable product.

The confidence thus gained is your best insurance of the continued high quality of PELLETEX.

MANUFACTURER
GENERAL ATLAS CARBON CO.
PAMPA, TEXAS
GUYMON, OKLA.

DISTRIBUTOR
HERRON BROS. and MEYER
NEW YORK, N. Y.
AKRON, OHIO

When the automobile came along, it practically spelled the end of Old Dobbin.

The same lesson is true in business. You may have all the luck in the world, but if you don't keep abreast of the times—if you don't take advantage of the trends—your luck will run out on you. We are constantly striving for newer, better methods for improving our service. Perhaps it is this quality, reflected in our day by day dealings, that has helped keep us out front, year in and year out, for over forty years.

H. MUEHLSTEIN & CO. INC.

122 EAST 42nd STREET, NEW YORK 17, N. Y.

BRANCH OFFICES: New York • Akron • Chicago • Boston • Los Angeles • Memphis

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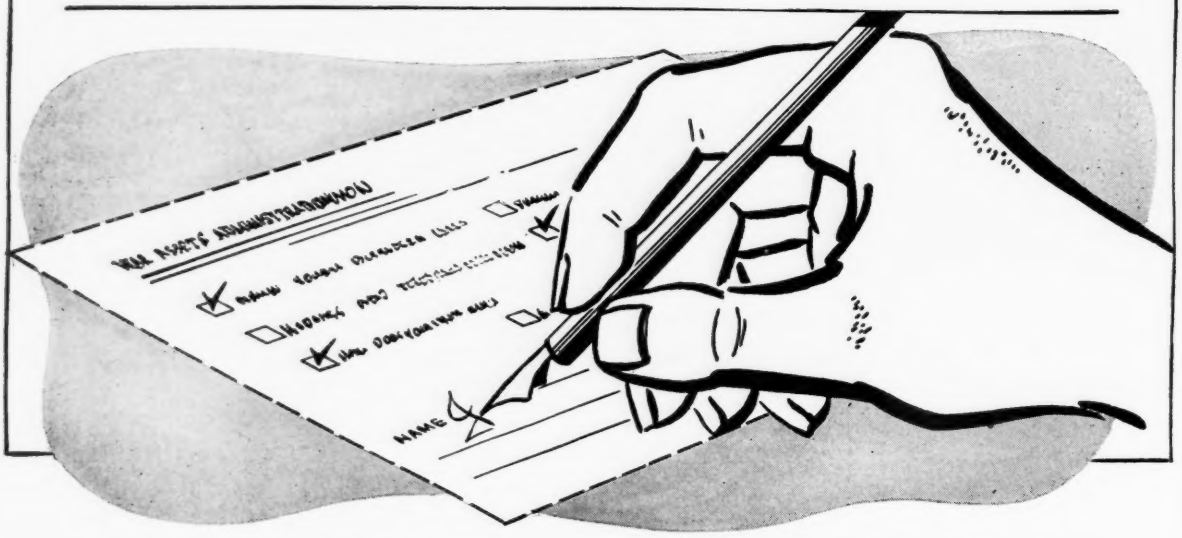


How to Locate Short Supply and Special Items of

INDUSTRIAL CHEMICALS

IF you need hard-to-get industrial chemicals, why not contact your War Assets Administration Regional Office? If what you are looking for is not in local supply, the WAA has set up a special Inter-Regional Sales Division to help find it for you—*quickly*—if it is available anywhere in the country.

Remember, there are hundreds of items in the vast stock pile of War Surplus industrial chemicals, many *at below-market prices!* Among them you may find the chemicals *you* want. All items are ready for quick sale and you may arrange convenient credit terms. Your nearest WAA Regional Office is listed below. Write today—or use the coupon below.

ONCE-IN-A-LIFETIME BUYS!

Acids	Calcium chloride
Gas cylinders (all types)	Dimethylaniline
Dyes and intermediated	Coal-tar
Plastic materials	Borax and boric acid
Solvents	Metal salts, oxide and hydroxides
Sealing and caulking compounds	Pitches Gases
Zinc carbonate	Rubber processing chemicals
Picric acid	Copper naphthenate
Welding fluxes	Synthetic & natural glues
Detergents and cleaners	Printing inks (black & colors)
Water treating compounds	and most other chemicals

33 REGIONAL OFFICES TO SERVE YOU

FREE FACTS

War Assets Administration (address nearest Regional Office)

Please supply without obligation, prices, available quantities and locations of items written in below:

....

....

....

..... (Describe item wanted)

Name..... Tel. No.....

Firm.....

Address.....

City..... State.....

155-5

All chemicals are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the material offered herein.

Much surplus property is available to the export market. Merchandise in short supply is withheld from export, and if such items appear in this advertisement they will be so identified by an asterisk.

WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

WHY THIS MILL

FITS INTO A PRODUCTION TEAM

This 26" x 84" sheeting mill is production teammate to a No. 11 Banbury. It is designed and custom-built to *fit the job* . . . to play an integral, efficiency-improving part in a rubber-making team.

The mill combines basic design principles, proven successful in the past, with more recently improved features that have also been thoroughly production-tested to prove their practical value.

Construction details include:

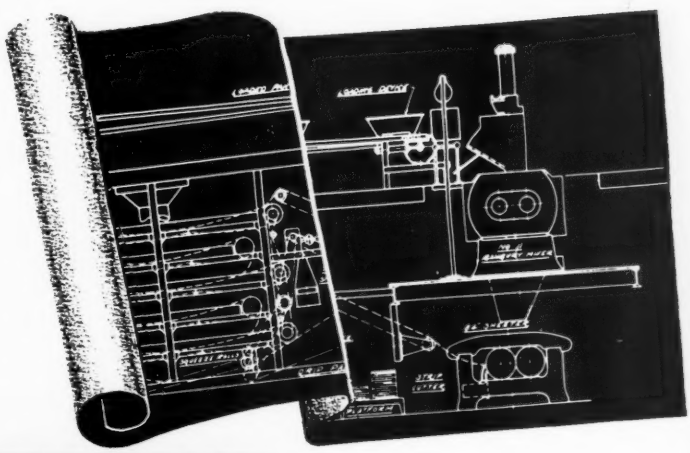
Mill rolls ground on bodies and journals, cored and fitted with interior pipe and overflow nozzles for the circulation of cooling water. Water-cooled, full bronze-lined journal boxes automatically force-feed lubricated.

Motor-operated adjustment of the front roll for accurate setting to exact guage. Steel adjusting screws driven by separate motor through bevel and worm gearing. Clutches permit independent adjustment of either roll end. Swivel, shear-pin type breaker with pull-back connects each screw with its journal box.

Hand-operated strip cutter with two adjustable knives; swinging bank board mounted over the rear roll; self-adjusting guides; cut spur gears, bath-lubricated in oiltight guards; individual motor drive through enclosed reduction unit; cast Meehanite housings and stringer bedplates of extra heavy proportions, are some of the other features of this F-B production unit.

When you need a mill to fit into your production set-up exactly, call on Farrel-Birmingham engineers for recommendations.

FB-344



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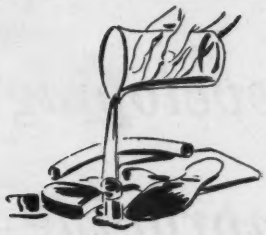
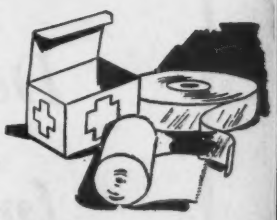
CHEMICAL MATERIALS FOR THE RUBBER INDUSTRY

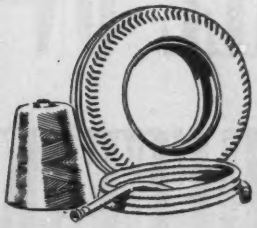
Hercules chemical materials for the rubber industry include:



Solvenol*...
A strong solvent for rubber, with a slow rate of evaporation. Widely used in rubber reclaiming.

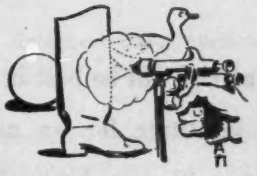


Staybelite* Esters...
Low-cost tackifiers, compatible with all synthetic rubbers. Valuable in pressure-sensitive adhesives.



Chemical Cotton...
Basis for the toughest high-tenacity rayon for automobile tires, hose, belting, and other rubber products.

Dresinate* 731...
One of Hercules' many resin derivatives, Dresinate 731 is the emulsifying agent used to make GR-S-10.



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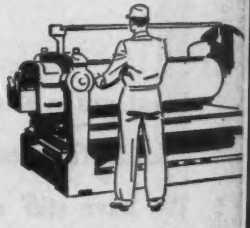

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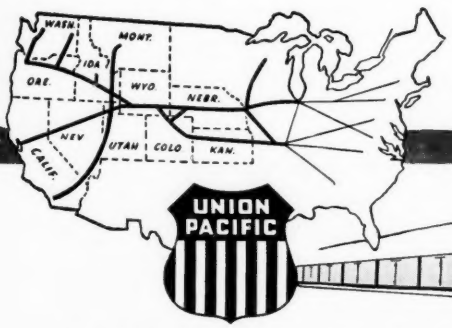

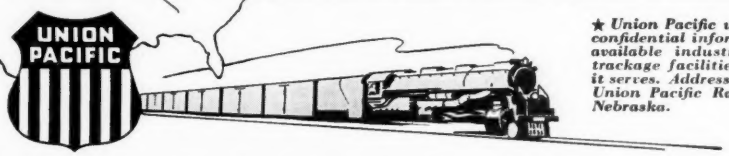

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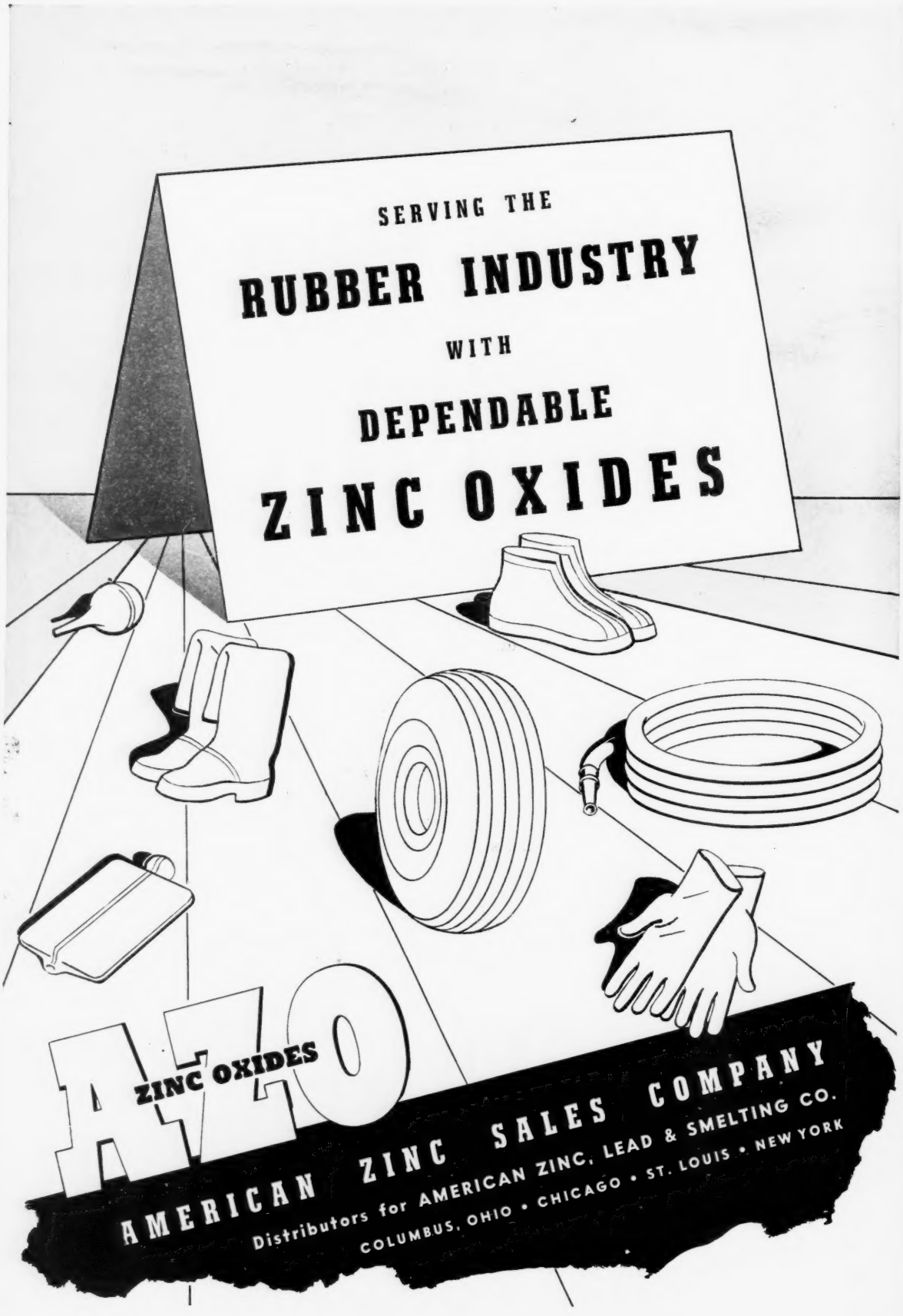
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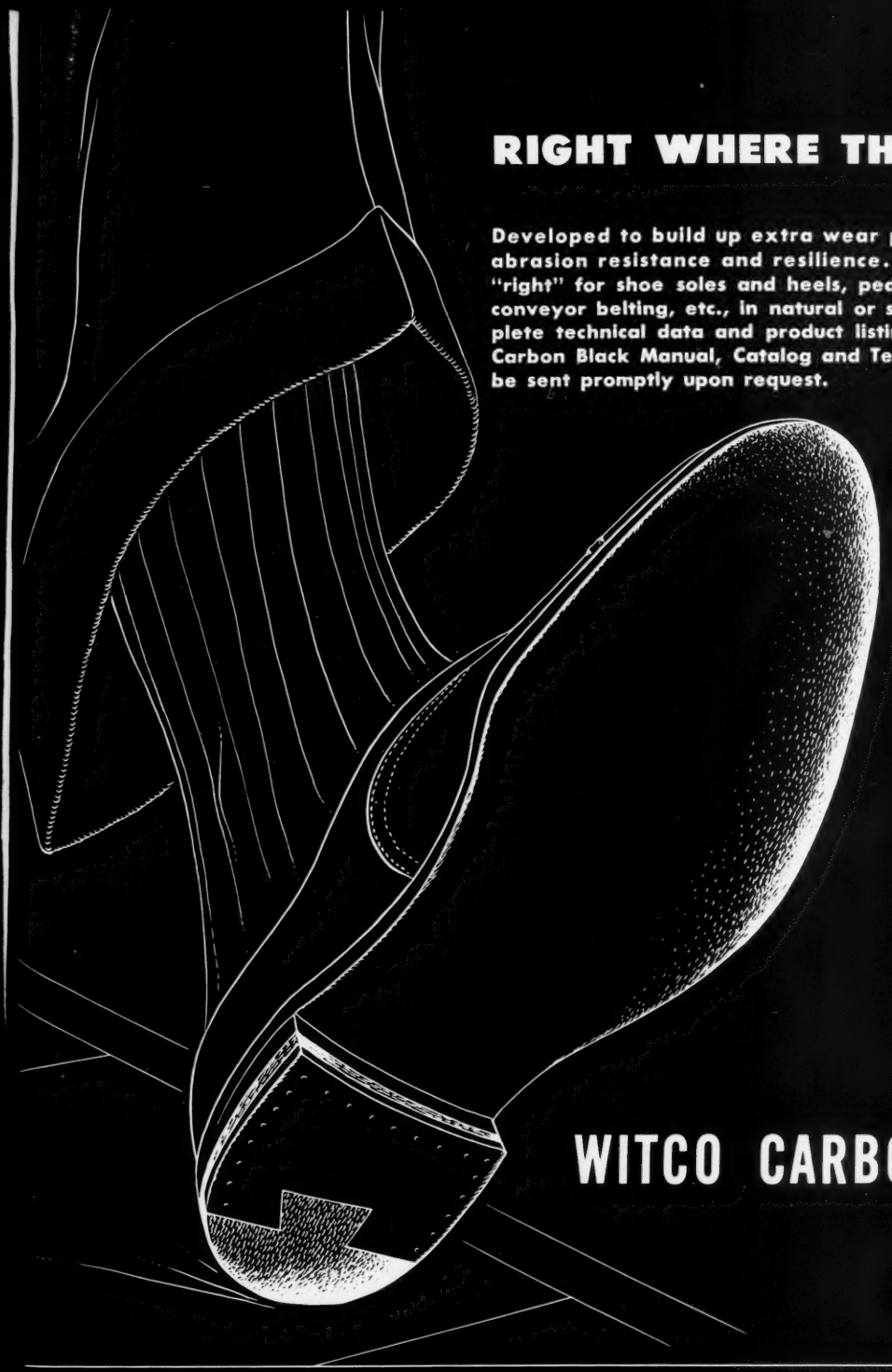

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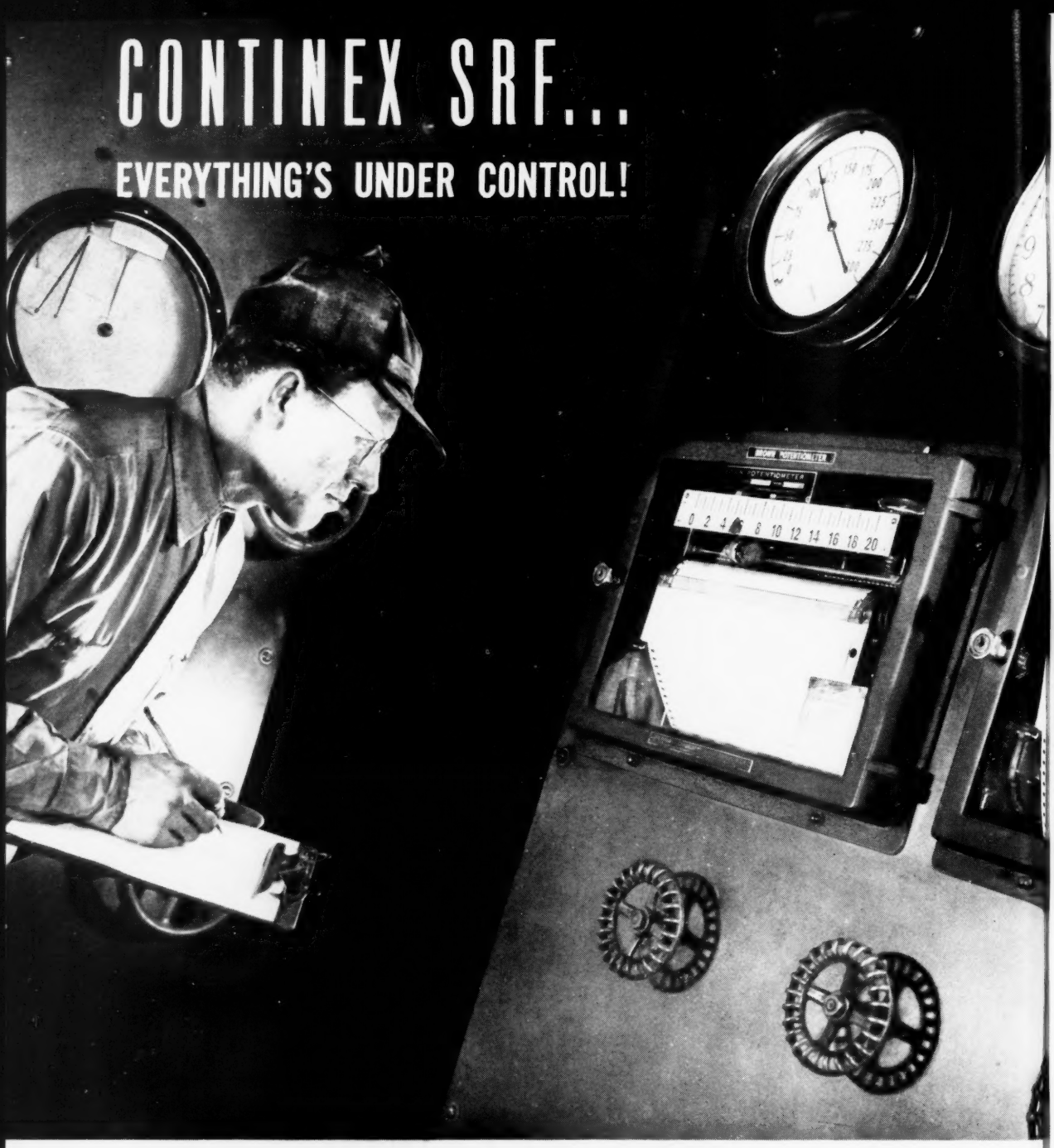

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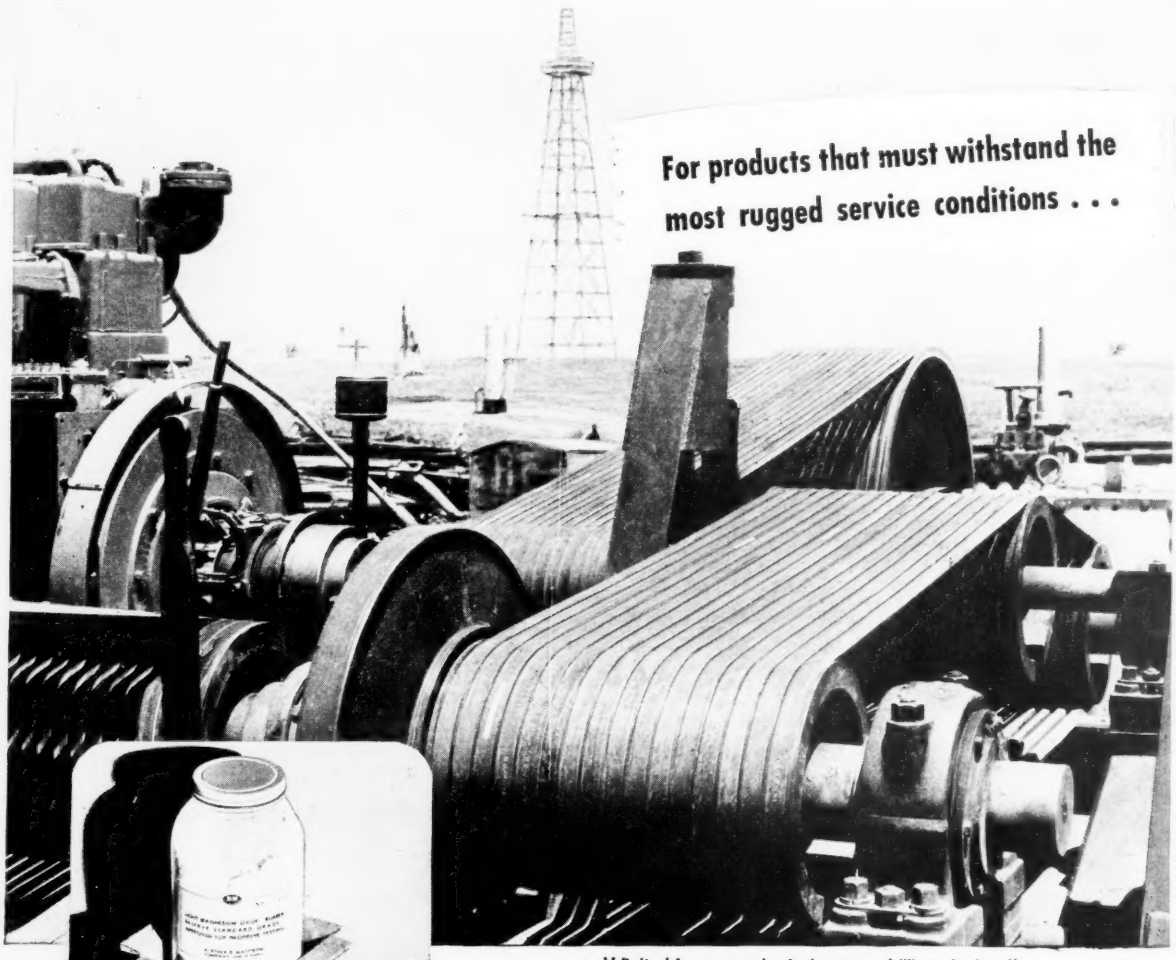
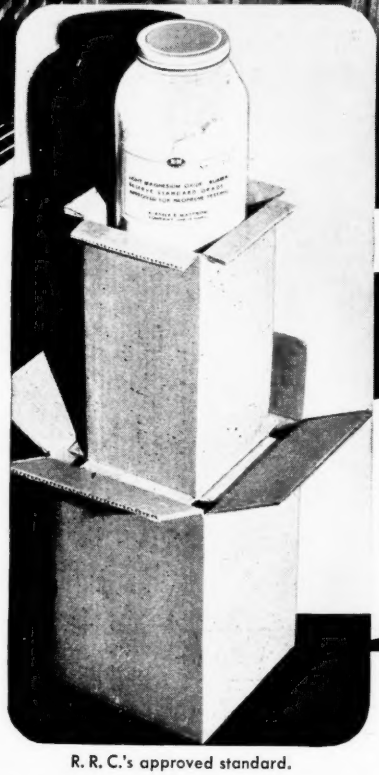


● V-Belt drive on mechanical rotary drilling rig in oil field. Photo courtesy L. H. Gilmer Company, Phila., Pa.



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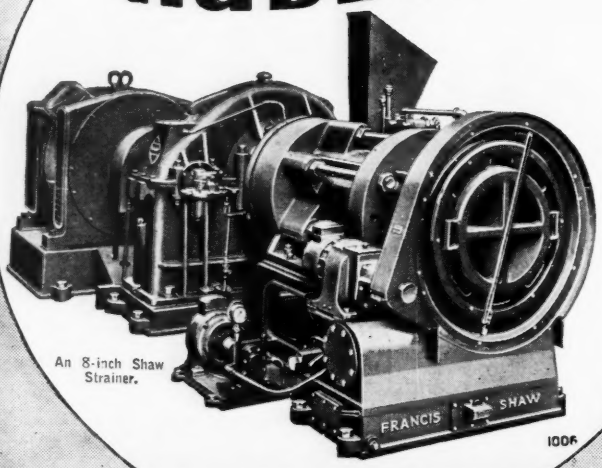

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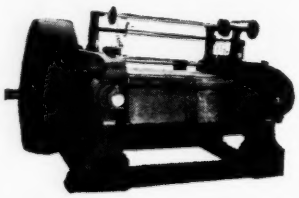

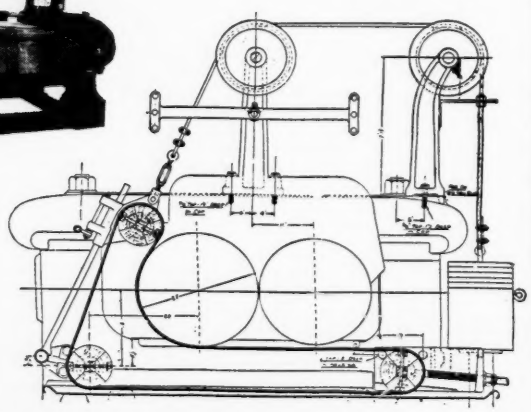

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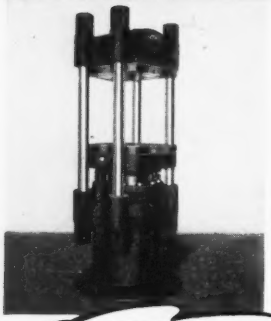
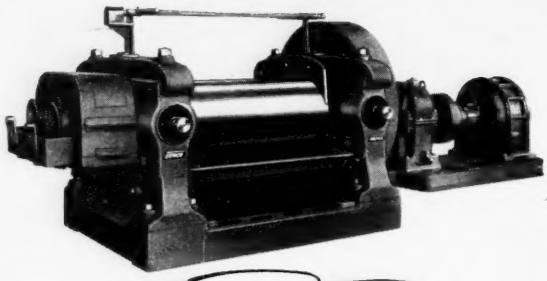
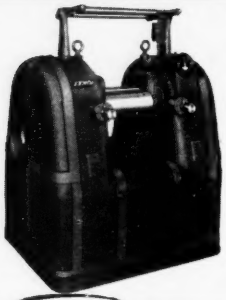


PRESSES



HEAVY DUTY MILLS



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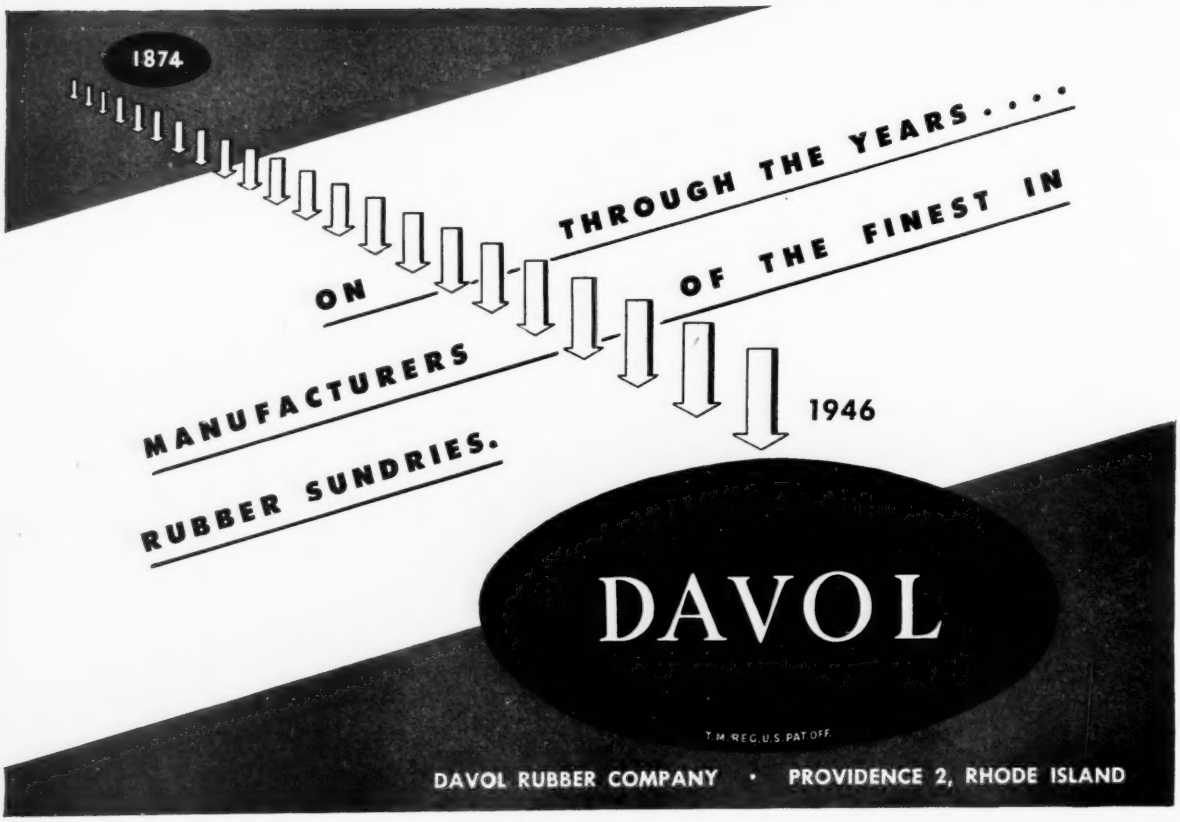

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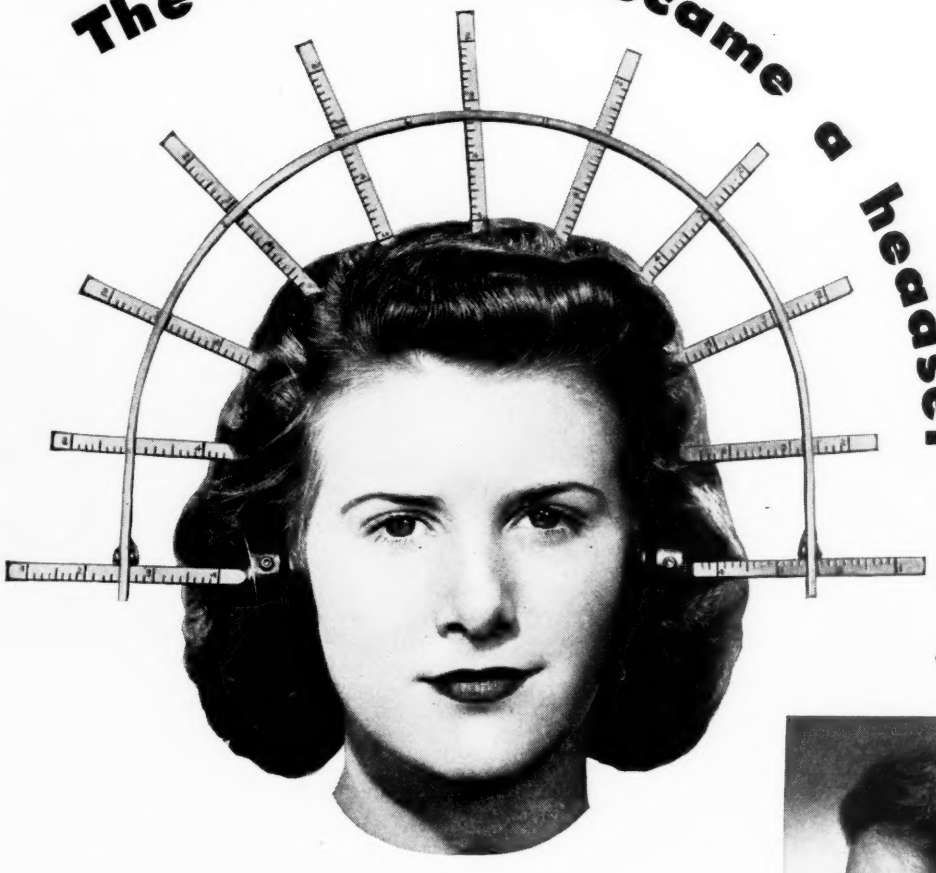

Telephone operators in New York, Atlanta and Montreal wore the strange head-dress you see pictured above. It's a specially devised gauging instrument — Bell Laboratories' scientists used it to measure head contours in designing the new operator's headset.

With the new set, the telephone user can hear the operator more clearly, and she in turn hears better too—through the improved receiver and transmitter. Her voice enters the transmitter at an even level because, as she turns, the mouthpiece moves with her. Neckstrap and horn are eliminated. The whole thing weighs less than six ounces.

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EXPLORING AND INVENTING, DEVISING AND PERFECTING FOR CONTINUED IMPROVEMENTS AND ECONOMIES IN TELEPHONE SERVICE

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Givaudan's G-4 possesses exceptional fungicidal, germicidal and antiseptic properties. It is nontoxic, non-irritating, safe to use in rubberized fabrics that come in contact with the human skin.

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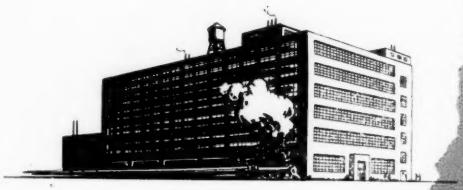

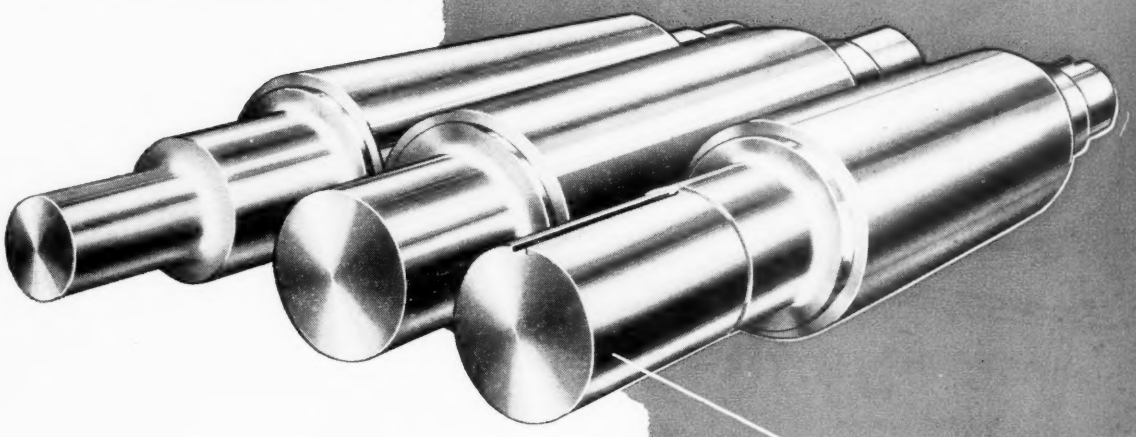

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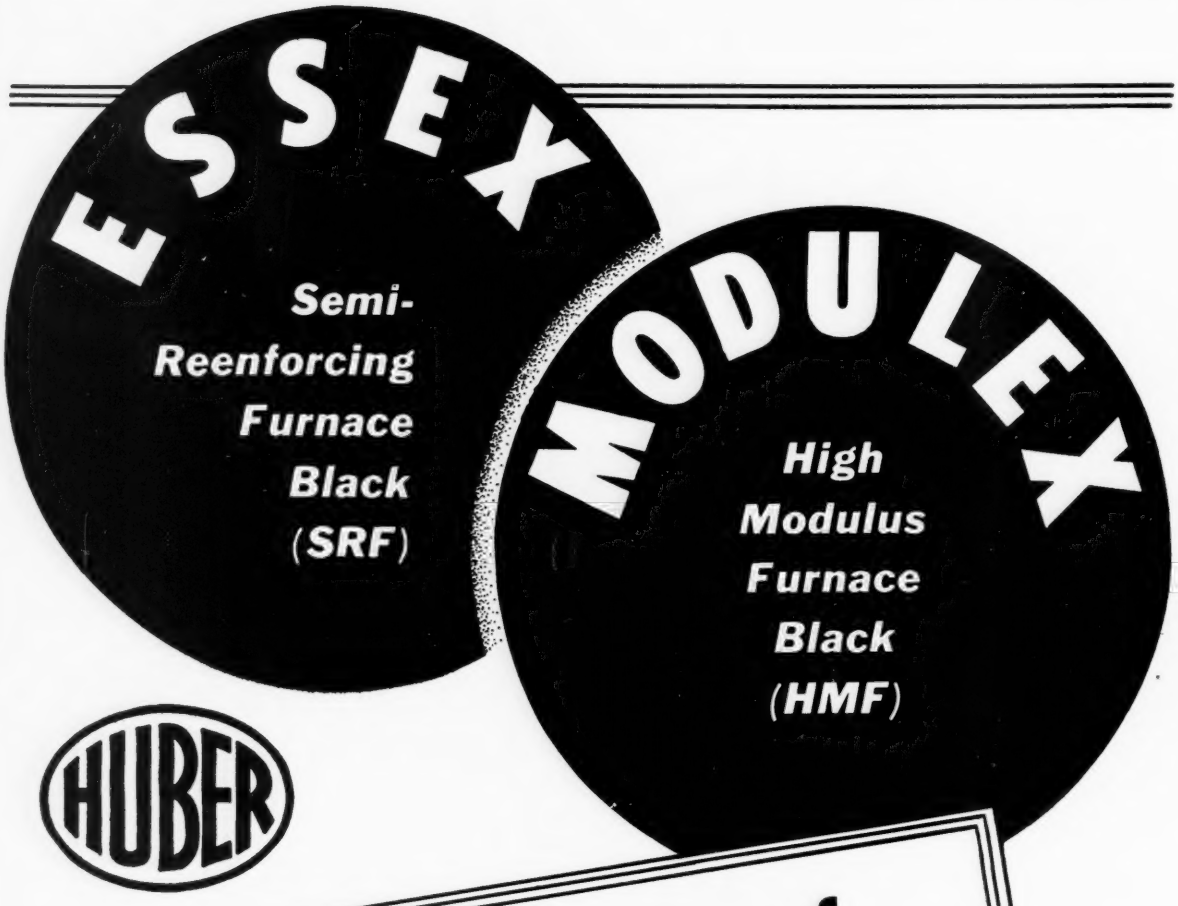

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ARTICLES

Hysteresis and Methods for Its Measurement in Rubber-Like Materials—I — J. H. DILLON and S. D. GEHMAN — 61

Improvements in Gas Mask Faceblanks—II — S. H. KATZ and IRVING POCKEL — 69

Recent Russian Literature on Natural and Synthetic Rubber—XXIII — M. HOSEH — 73

OTS Bibliography Reports on Rubber Products—IV — 75

The One Hundred and Tenth Meeting of the American Chemical Society — 78

Flexible Organic Adhesives as Structural Elements — D. L. LOUGHBOROUGH and F. D. SNYDER — 84

DEPARTMENTS

	Pages
Editorials	77
Scientific and Technical Activities	78
Plastics Technology	84
Foreign Trade Opportunities	87
News of the Month:	
United States	88
Obituary	92
Canada	102
Financial	103
Patents	104
Trade Marks	108
New Machines and Appliances	110
Goods and Specialties	114
Rubber Industry in Far East	118
Africa	122
Europe	125
Book Reviews	126
New Publications	127
Bibliography	130
New Incorporations	134
Trade Lists Available	134

MARKET REVIEWS

	Pages
Cotton and Fabrics	132
Scrap Rubber	132
Crude Rubber	132
Reclaimed Rubber	134
Compounding Ingredients	136

STATISTICS

Dominion of Canada, July, 1946	131
Rims Approved and Branded by The Tire & Rim Association, Inc.	140
Tire Production, Shipments, and Inventory	90
CLASSIFIED ADVERTISEMENTS	142
ADVERTISERS' INDEX	147
ANNUAL INDEX	148

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Volume 115 New York, October, 1946 Number 1

Hysteresis and Methods for Its Measurement in Rubber-Like Materials—I

J. H. Dillon [1] and S. D. Gehman [2]

THIS review was prepared at the request of the Polymer Research Branch of the Rubber Director's Office in connection with the cooperative wartime research program for the development of synthetic rubber. This review was originally presented before a meeting of the Research Discussion Group of the Rubber Director's Office in New York on September 14, 1943. The joint authorship of the work by representatives of the laboratories of two large competitive companies, Firestone and Goodyear, characterized the spirit of cooperation which existed in the emergency.

Nature of Hysteresis and Significance of Various Hysteresis Expressions

After a piece of rubber undergoes a mechanical distortion, it is never the same again. The truth of this statement depends, of course, on the degree of precision and discrimination of the observations. Superficially, and for most practical purposes, it may appear to be unaltered. The point is that in any deformation of rubber there are always some irreversible processes which lead to the conversion of mechanical energy into heat and to a departure from the behavior of an ideal elastic material.

Tests which have been used to evaluate hysteresis loss in rubber-like materials may be classified as follows:

1. Low-speed stress-strain loop.
2. Impact resilience.
3. Free vibration.
4. Forced vibration at resonance.
5. Forced vibration; non-resonance.

We will first discuss the general principles involved in these different methods of testing and subsequently will describe the experimental procedures and results in more detail.

[1] Research laboratory, Firestone Tire & Rubber Co., Akron, O.
[2] Research laboratory, Goodyear Tire & Rubber Co., Akron.

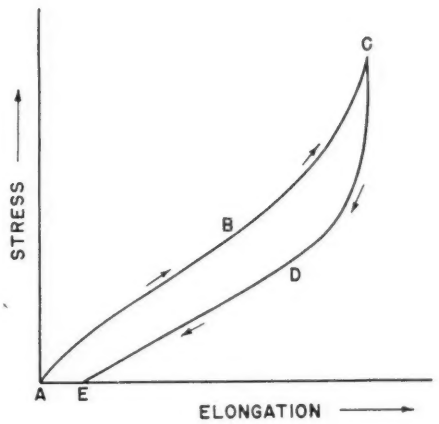

Fig. 1. Static Hysteresis Loop

For relatively large, slow deformations, depending upon the experimental conditions, imperfections in elasticity become apparent as hysteresis, permanent set, creep, time lag for recovery or stress relaxation.

Low-Speed Stress-Strain Loop

The familiar tension hysteresis loop is shown in Figure 1. The area of the loop is proportional to the elastic energy which has been converted into heat. The total work expended on the rubber is the area under the curve ABC. Hence the per cent. hysteresis or hysteresis loss is defined as the ratio of the area of the loop to the area under the curve ABC expressed as per cent.

From inspection of the loop it becomes apparent that its occurrence can be ascribed either to creep, stress relaxation, or time lag of recovery, depending upon the point of view. Likewise, the permanent set, AE, contributes to the hysteresis.

For small, rapidly repeated deformations the hysteresis loss becomes readily observable as a temperature rise in the test piece. All of these phenomena, hysteresis, set, creep, stress relaxation, and heat development upon flexing are the external manifestations, in whole or in

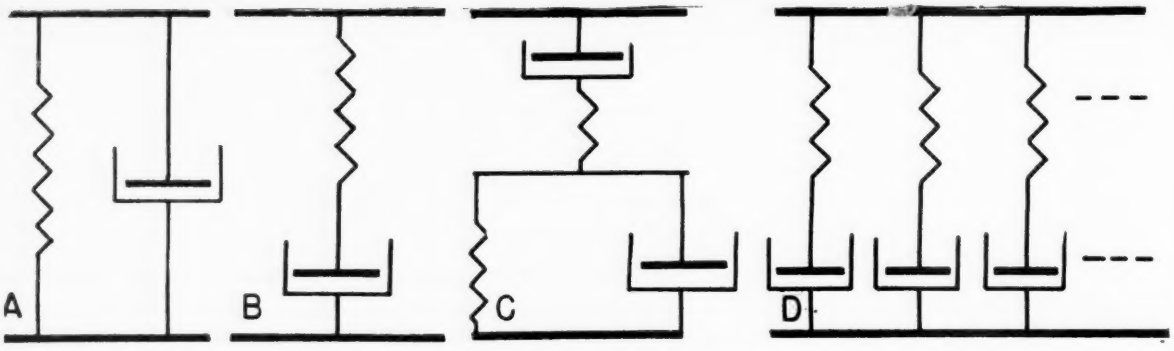

Fig. 2. Mechanical Models
A. Parallel Model B. Maxwell Model C. Model with Series Creep Element D. Generalized Model

part, of fundamental molecular processes which occur when the rubber structure accommodates itself to stress. Segments of the long-chain molecules in any localized region have preferred orientations or configurations with respect to each other. The application of stress disturbs these configurations and requires new equilibrium configurations. For some types of rubber this molecular readjustment may actually result in crystallization or a fixation of the molecules in a space lattice. In the process of passing from the unstressed to the stressed configurations some of the applied mechanical energy is degraded by molecular vibrations and rotations and energy losses occur.

Mechanical models to represent the elastic behavior of rubber have been frequently proposed (1)[3]. They consist of springs with dash-pots as friction elements. The mathematical procedures for solving such systems are definite and straight forward (2). Four such models are shown in Figure 2. Model A is a simple model consisting of a spring and dash-pot in parallel. It suffices to describe many of the vibration phenomena with rubber. Model B is the series model employed by Maxwell in his theory of relaxation phenomena. If it is desired to explain the elastic behavior of rubber in more detail by such models and to include a wider range of elastic phenomena, it becomes necessary to introduce more elements into the model thus increasing its complexity. Model C represents one step in this direction; the series elements help to explain long-term creep and stress relaxation. The most general system of this type consists in a parallel net work of "Maxwell elements" (dash-pot and spring in series), shown in Model D.

Such models can be readily devised to explain a limited range of phenomena, but in doing this explaining care must be taken to avoid inconsistencies with other data equally as significant. These models are to be regarded merely as formal aids to thinking at the present time although eventually it may be possible to identify various aspects of the molecular structure with the different elements.

Impact Resilience

Probably the most widely used test for estimating for resilience of rubber is the ball or pendulum rebound test. In this test the percentage of the original impact energy which is returned to a ball or pendulum after impact with a block of rubber is determined. It is not a vibration test which is characterized by a cyclic interchange of potential and kinetic energy, but workers using vibration tests have usually tried to correlate their results with the rebound test and to interpret them in terms of rebound. This practice has led to some confusion and error and explains many of the forced interpretations of vibration results. The closest analogy which can be drawn between the rebound test and a vibration test is to regard the deformation in the rebound test as corresponding to a half cycle of damped vibration.

For free vibrations, where a mass is supported by rubber and set into oscillation at the natural frequency of the system, hysteresis becomes evident as a falling off or decay of amplitude for successive vibrations.

The equation of motion is

$$m\frac{d^2x}{dt^2} + b\frac{dx}{dt} + sx = 0 \qquad (1)$$

with the solution

$$x = x_0 e^{-bt/2m} \cos p_0 t; \qquad (2)$$

$$p_0 = \frac{\sqrt{4ms - b^2}}{2m}. \qquad (3)$$

For "critical damping,"

$$b_c = 2m\sqrt{\frac{s}{m}}$$

m = mass (grams)
x = displacement (cm.)
t = time (sec.)
b = constant of proportionality between frictional force and velocity (dynes per cm. per sec.)
s = spring stiffness (dynes per cm.)
p_0 = angular frequency (radians per sec.).

Figure 3 shows a damped free vibration as given by equation (2).

Resilience is defined in the dictionary in its engineering usage as the energy given back by a body which is released after being strained up to its elastic limit or, alternatively, the energy required to stress a body to its elastic limit. In the application of the word to rubber, it has been used in a very broad sense and with various shades of meaning. Since rubber does not have an elastic limit in the ordinary sense, some modification of the definition is required if the word is to be used at all in connection with rubber. The term "proof resilience" has been used to denote the energy required to stress a cu. in. of rubber to its breaking point. But the term "resilience" in connection with rubber has acquired a general significance as expressing the relative amount of energy which is returned by the rubber after any deformation.

Free Vibration

For a rubber vibration test it seemed advisable to

[3]Bibliography references appear at end of this installment.

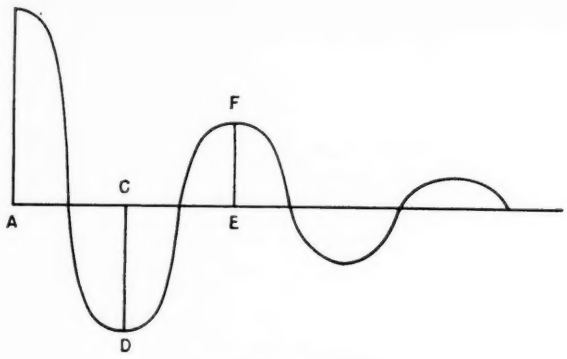

Fig. 3. Free Vibration

qualify the word and to extend its usefulness by defining the "dynamic resilience" as the fraction of the vibrational energy which persists in the second of two successive free vibrations. The damping, or the fraction of the vibrational energy dissipated as heat in a cycle of vibration, is then (1 — dynamic resilience).

The energy in a vibration is proportional to the square of the amplitude. Therefore, referring to Figure 3,

$$\text{Dynamic resilience} = \overline{EF}^2/\overline{AB}^2 = R \qquad (4)$$

From Equation 2, by letting t equal the periodic time, $2\pi/p_0$, it follows that

$$\frac{\overline{EF}}{\overline{AB}} = e^{-\pi b/mp_0} \qquad (5)$$

and

$$R = \frac{\overline{EF}^2}{\overline{AB}^2} = e^{-2\pi b/mp_0} = e^{-2\pi p_0 b/s}. \qquad (6)$$

The logarithmic decrement is

$$\text{ln.}\ \frac{\overline{AB}}{\overline{EF}} = \frac{\pi b}{mp_0}$$

In order to secure values of resilience which corresponded to those with the rebound pendulum, Naunton and Waring (3) used the ratio, $100\ \overline{EF}/\overline{AB}$, as the resilience. This is the percentage of the vibrational energy which remains after half a cycle of vibration.

Yerzley (4) called $\frac{\overline{EF}+\overline{CD}}{\overline{AB}+\overline{CD}}$ the percentage resilience.

This ratio can be shown to be equivalent to $\sqrt{\overline{EF}/\overline{AB}}$ or the fourth root of the "dynamic resilience" (5).

The most practical interest attaches to the energy losses which occur in the case of rapidly repeated, relatively small deformations because in this case the heat developed may become destructive.

For forced or sustained vibrations with a sinusoidal driving force F cos pt, the equation of motion, is

$$m\frac{d^2x}{dt^2} + b\frac{dx}{dt} + sx = F\cos pt. \qquad (7)$$

The steady state solution of which is

$$x = \frac{F}{\sqrt{(s - mp^2)^2 + b^2p^2}}\cos(pt - \phi). \qquad (8)$$

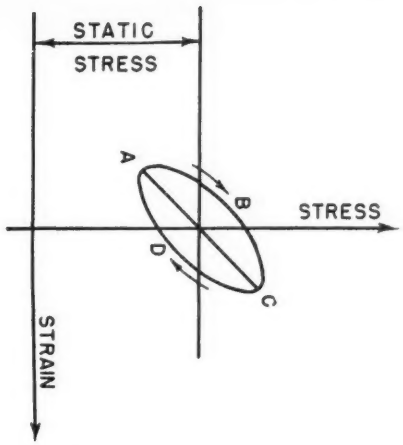

Fig. 4. Vibrational Hysteresis Loop

where the phase angle is

$$\phi = \tan^{-1}\left(\frac{bp}{s - mp^2}\right) \qquad (8a)$$

The presence of the damping term $b\frac{dx}{dt}$ results in the dynamic stress-strain cycle shown in Figure 4. The hysteresis loop is an ellipse, and its area represents the energy dissipated per cycle.

Forced Vibration at Resonance and Non-Resonance

Laboratory tests employing forced vibrations of a rubber-mass system tuned to resonance (6, 7) have proved to be very useful in evaluating hysteresis losses. Here the effect of the damping is to limit the amplitude at resonance to a finite value.

From Equation 8, at resonance ($x = x_{max}$), so

$$p^2 = \frac{s}{m} - \left(\frac{b}{2m}\right)^2$$

or to a first approximation

$$s = mp_0^2 \qquad (9)$$

$$b = \frac{F}{p_0 x_{max}} \qquad (10)$$

Consequently s and b can be determined by measurement of the amplitude, frequency, mass, and driving force at resonance.

It has been found experimentally that the product bp is approximately constant as frequency is varied. s is also invariant with frequency. Hence both the amplitude at resonance [see equation (10)] and the dynamic resilience as given by equation (6) are insensitive to frequency.

Kosten (8) made use of the invariance of bp with frequency to express the results of vibration tests in terms of the close analogy which exists between oscillating electrical circuits and vibrating mechanical systems. Analogous to the angle of loss in alternating current theory, he defined the angle of loss for rubber as δ where

$$\tan\delta = \frac{bp_0}{s} \qquad (11)$$

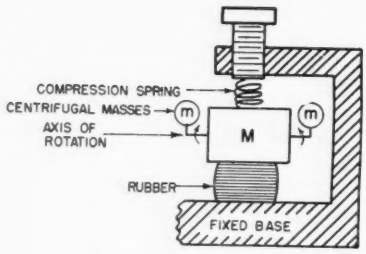

Fig. 5. Kosten Apparatus

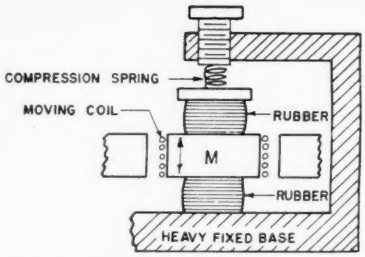

Fig. 6. Naunton and Waring Apparatus

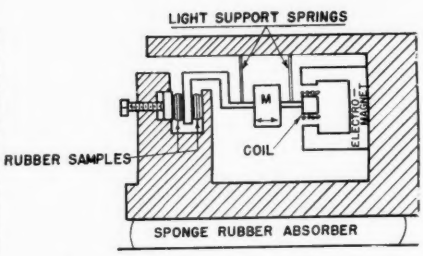

Fig. 7. Goodyear Resonance Vibrator

For rubber test pieces vibrating in compression, s and b are dependent on the size and shape, except for very low shape factors (9). The shape factor is the ratio of the loaded area to the free area of the test piece. Independence of size can be secured by defining new quantities, E and η_i, given by

$$E = s\left(\frac{h}{A}\right) = s.q. \qquad (12)$$

E = dynamic modulus
h = height of test place
A = area of test piece
q = form factor

$$\eta_i = \left(\frac{h}{A}\right) = b.q. \qquad (13)$$

η_i is called the internal friction. It has dimensions of viscosity in the case of shear vibrations.

In these terms, $R = e^{-2\pi p_0 \eta / E}$ (14)

For shear vibrations, the equations are essentially the same. In this case use of the factor h/A gives values for η_i and G, the shear modulus, which are independent not only of size, but also of the shape of the test piece. This point has been established by Dillon, Prettyman, and Hall (7).

The heat generated per cycle of vibration can be calculated by performing the integration $\int b\,X\,d\,x$ over a complete cycle. The result is

$$H_x = \frac{\pi p \eta_i X^2}{q} \qquad (15)$$

or

$$H_F = \frac{\pi q p \eta_i F^2}{(E - mqp^2)^2 + \eta_i^2 p^2} \qquad (16)$$

where X is the amplitude of vibration, and F is the maximum value of the impressed force. H_x is the heat generated per cycle for constant amplitude vibrations. H_F is analytically equal to H_x, but is in a form convenient for calculating the heat generated per cycle in constant force vibrations. The expressions are both general and apply to the vibrations in the testing apparatus or to a product subjected to a periodic impressed force. For the case of a tire, where the operating frequency p is generally much below the resonance frequency $p_0 = \sqrt{E/mq}$, we then have

$$H_x = \frac{\pi p \eta_i X^2}{q} \qquad (17)$$

$$H_F = \frac{\pi q p \eta_i F^2}{E^2} \qquad (18)$$

Now for small values of $p\eta_i/E$,

$$R = e^{-2\pi p \eta / E} = 1 - 2\pi p \eta_i E$$

or

$$\pi p \eta_i = \frac{E}{2}(1 - R)$$

Thus we obtain H_x and H_F in terms of the dynamic resilience R as

$$H_x = \frac{1}{2q}(1 - R)\,E\,X^2 \qquad (19)$$

$$H_F = \frac{q}{2}(1 - R)\frac{F^2}{E} \qquad (20)$$

For constant amplitude vibrations, the relative heat generation at a given frequency of two stocks 1 and 2 can be calculated from the ratio η_1/η_2 or $(1-R_1)E_1/(1-R_2)E_2$. Likewise the relative heat generation at constant impressed force is given by $\eta_1 E_2^2/\eta_2 E_1^2$ or $(1 - R_1)E_2/(1 - R_2)E_1$.

The determination of the relative values of H_x and H_F is the important accomplishment of forced vibration testing.

Direct determinations of heat generation in rubber can be made by observation of the temperature rise in a rapidly flexed test piece. Here there is the advantage that in such a comparison the various rubber samples will be running at different temperatures built up by flexing, as will be the case in service. A number of flexometers have been developed for such measurements (10, 11) but they have suffered in general from the disadvantage that they do not employ well-defined static and dynamic strain and stress conditions.

Application of Hysteresis Measurements

The diversity of methods for determining hysteresis losses requires that careful consideration be given to the significance of any particular laboratory result for a given application. Where a choice of methods is available, it is, of course, highly desirable to select the one which will approximate service conditions most closely in regard to such variables as frequency, amplitude, temperature, etc.

One of the most important points involves the question as to whether the stocks to be compared will be working with the same deformation or whether the deformation will depend upon the stiffness of the stock. As indicated by equations (19) and (20), the relative ratings of two stocks in regard to heat generation may easily be reversed, depending upon whether they are compared under constant amplitude or constant force conditions. If in service the deformation of the stocks is not the same, but varies owing to the stiffness of the

stock, then the dynamic modulus as well as the hysteresis loss must be taken into account in estimating the heat generation and in evaluating test results.

Clear-cut illustrations of constant force and constant amplitude applications are offered by solid tires and rubber belts, respectively. In the case of a pneumatic tire tread, the deformations occur under a complicated set of circumstances, some elements of which correspond to constant force and some to constant amplitude conditions.

In selecting the type of hysteresis test which seems most desirable for tread stocks, it is well to consider the frequency and amplitude involved. The speed of deformation for normal operating conditions corresponds to a frequency of the order of several hundred cycles per second. This is estimated from the time interval involved in the load application to a small, finite element of length of the tread, such as, for instance, a button in the tread design. There is, of course, an interval of rest between load applications so that the actual deformation history would probably require a Fourier analysis for a mathematical description. Nevertheless it is apparent that a laboratory test for hysteresis in this case should be carried out at relatively high frequencies and low amplitudes.

Resiliometer (drum) tests carried out to investigate the mechanism of heat generation in tire treads (11) indicated that approximately 50% of the temperature rise could be attributed to amplitude cycles of magnitude independent of the stiffness of the stock; the other 50% is due to force cycles the deformations from which would depend on the stiffness.

This situation requires a laboratory test which will evaluate stocks under both constant force and constant amplitude conditions. A forced vibration test appears to be the most desirable of any proposed, both in respect to approaching the service conditions and in its ability to give the information wanted.

Of the forced vibration tests, a flexometer test is the most direct, but means must be provided for measuring the temperature rise under both constant force and constant amplitude conditions.

Review of Various Hysteresis Test Methods

The foregoing discussion has set forth in a rather general manner the nature of hysteresis from the viewpoints of both gross mechanical systems and idealized molecular models. The significance of the various types of hysteresis indices with respect to service conditions has also been treated. A detailed review of the five principal classes of hysteresis tests will follow.

Low-Speed Stress-Strain Hysteresis Loop Method

Measurement of the area between the extension and retraction curves, as obtained with various types of tensile testers, was probably the earliest form of hysteresis test. It was soon found that the area of the hysteresis loop rapidly decreased in successive cycles of extension and retraction, reaching an approximately constant minimum value ("equilibrium" value) in the fourth or fifth cycle (12). The area of the loop decreases markedly, with increasing temperature (13).

In general, the hysteresis loss per cycle has been expressed as the area of the loop divided by the area between the extension curve and strain axis, i.e., the fraction of the energy of extension absorbed by the rubber sample per cycle. This hysteresis index, which we shall call H_1, is easily measured either in tension or compression and is clear-cut in interpretation, provided it is remembered that it refers to a particular arbitrary set of testing conditions. Unfortunately H_1 varies with rate of strain, minimum strain and previous strain history in a rather complicated manner (14). Since rubber seldom finds application under the conditions of strain and rate of strain found in an ordinary tensile machine, it is very dangerous to rely on the static hysteresis as a fundamental indication of the hysteresis defect of a given polymer or stock. A study of hysteresis loops for GR-S in comparison with *Hevea* does show significant differences in dependence upon strain (15).

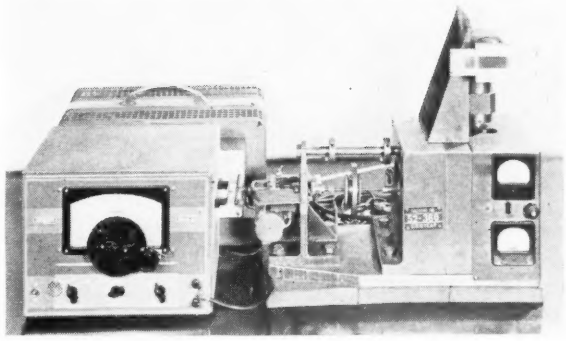

Fig. 8. Goodyear Resonance Vibrator

Impact Hysteresis Method

Another type of hysteresis test which has been employed since the beginnings of rubber technology is the impact resilience test (16, 17). Impact resilience is defined as the returned fraction of the available impact energy of a freely falling ball or pendulum hammer, striking and rebounding from a rubber block. Thus, if y_0 is the vertical height of fall of a ball or pendulum hammer, and y_1 is the height of rebound, impact resilience is y_1/y_0. The fractional impact hysteresis loss is then $H_2 = 1 - y_1/y_0$.

Both simple and compound pendulums have been employed. One simple form of impact resilience apparatus consists of a steel ball bearing, released from one pole of an electromagnet so that it falls upon the flat horizontal surface of a rubber block held against a heavy steel plate by vacuum applied through small drilled holes in the plate (7). The per cent. resilience is read directly on a vertical scale. When only small polymer samples are available, the apparatus may be operated by dropping small cured rubber balls (0.5-inch diameter or smaller) against a steel plate and noting the rebound. The rubber balls are released by destroying a vacuum in a small hole drilled axially in the electromagnet core. It has been found that excellent correlation exists between the results of the various impact resilience tests although the absolute magnitude of the resilience depends upon ball (or hammer) size (18) and shape and to a small extent upon the effective height of fall. (See Table 1).

TABLE 1. BALL REBOUND *vs.* BALL SIZE AND HEIGHT OF FALL

	(Room Temp.) Cm.				
Height of fall.....	61	81	100	100	100
Steel ball diam.....	1.9	1.9	1.9	1.27	0.8
			% Ball Rebound		
Stock					
Hevea gum	82.0	81.0	80.5	75.5	61.0
Hevea tread	57.4	57.4	56.8	54.0	46.0
GR-S gum	53.3	52.5	52.0	49.0	40.0
GR-S tread	31.2	31.5	30.5	29.0	28.0

	Cm.		
Height of fall.....	100	100	100
Rubber ball diam...	2.54	1.27	0.63
	% Ball Rebound		
Stock			
GR-S tread	47.0	46.0	40.0

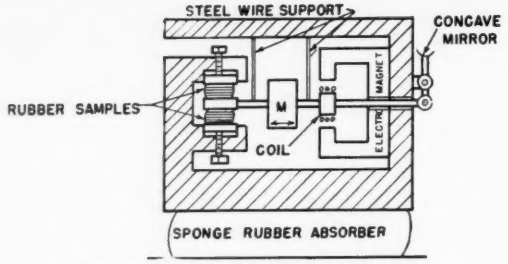

Fig. 9. Firestone Resonance Vibrator

Windage is generally a small factor, but care must be taken to hold the rubber block tightly against a heavy mass. Pendulum supports should be very rigid. As in the case of all hysteresis tests, hysteresis decreases (rebound increases) upon successive impacts, but reaches a stable value after three or four impacts. Some workers recommend a vigorous beating or repeated deformation of the sample before testing in order to attain equilibrium, but this is generally unnecessary; repeated impacts of the ball or hammer at the same point on the sample generally give a simpler and more reproducible pretreatment.

Tests at elevated temperatures are easily performed with impact tests since the resilience is altered very little by the stiffer surface layers of the sample which result from cooling immediately after removal from an oven. Five or six repeat rebounds can easily be obtained with the falling steel ball apparatus, described above, when the rubber cylinders (0.75-inch high, 1.59-inch diameter) are heated to a uniform temperature of 100° C., quickly removed from the oven, and placed on the vacuum platen. Seriously misleading results are obtained, however, if the sample is allowed to cool, and rebounds are taken at successively lower temperatures, as indicated by a thermocouple with junction imbedded in the sample (19). The temperature distribution within the sample changes with time, and the temperature of the outer layers of rubber becomes increasingly a controlling factor as the sample cools.

Hence, if the thermocouple junction is in the center of the sample, it will indicate too high a temperature in the intermediate stages of cooling. If the junction is near the surface of the sample, it will indicate too low a temperature in the earlier stages. Obviously the correct procedure is to preheat the samples in an oven set at the desired temperature of test and transfer them and test them as quickly as possible. The use of a thermocouple is unnecessary except to indicate attainment of the oven temperature at the center of the sample. It should be remarked that greater care must be taken with tests at low temperatures since the softer warming surface layers of the sample will appreciably affect the rebound within less than a minute after removal of the samples from the cold chamber. Condensed moisture on the samples undoubtedly affects the results, but reliable data can be obtained by rapid manipulation.

The impact resilience type of test is extremely simple, rapid, and precise, and it is not surprising that it has come into almost universal use in the development of synthetic polymers. Unfortunately impact resilience is a function not only of the internal friction η, but also depends on the dynamic modulus E. For example, consider the case of a metal cylinder of mass, M, falling axially from a height, h_1, upon the flat surface, A, of a cylindrical rubber block of height, y. If h_2 is the height of rebound, and $h_2 > y$, the impact resilience may be calculated for the half cycle as:

$$R = \frac{h_2}{h_1} = e^{-\pi\eta/\sqrt{qME}} \qquad (21)$$

Fig. 10. Firestone Resonance Vibrator

where $q = y/A$. It is seen that R depends principally upon the internal friction or hysteresis defect η, but also varies with the dynamic modulus E. In the large majority of cases η is the controlling factor in the exponent, but sometimes radical changes in polymer structure or compounding produce much larger changes in E than in η, and an increase in the value of R indicates an increase in modulus or hardness rather than a lower internal friction. Now η is the controlling factor in heat development in constant amplitude forced vibrations at a given frequency and, by definition, represents the hysteresis defect.

It thus appears extremely unfortunate that so much reliance has been placed on impact resilience which is a function of both η and E. Resilience is extremely easy to measure, of course, and is only slightly dependent on frequency, but these advantages hardly justify its use as a fundamental hysteresis index. In any event hardness (or better, dynamic modulus) must be taken into account when interpreting impact resilience data in terms of heat generation. The pendulum type of impact tester (16) offers definite advantages in this respect since relative values of dynamic modulus may be estimated from the "dynamic penetration" although the relation between modulus and penetration is not linear. Hence penetration values or their reciprocals cannot be used directly as a measure of dynamic modulus.

Free Vibration Method

The free vibration method of measuring hysteresis has found considerable favor (4, 20). The most common technique employs a simple torsion pendulum system. The rubber sample is twisted to a fixed torsional deflection and released, thus going into damped torsional vibration, the radian frequency of which is approximately

$$p_0 = \sqrt{\frac{G}{Iq'}} \qquad (22)$$

where G is the dynamic shear modulus, I the moment of inertia, and q' a geometrical factor which is constant for any particular rubber sample. The angular amplitudes for successive full cycles are then θ_1, θ_2, θ_3, and the resilience is calculated as

$$R' = \left(\frac{\theta_2}{\theta_1}\right)^2 = \left(\frac{\theta_3}{\theta_2}\right)^2 = \ldots = e^{-2\pi p_0\eta/G} = e^{-2\pi\eta/\sqrt{q'IG}} \qquad (23)$$

This quantity is analogous to the impact resilience R except that it is calculated for a full cycle. It is nearly independent of the frequency selected as are the variables $p_0\eta$ and G, in the frequency ranges usually employed. The same criticisms given for impact resilience apply to

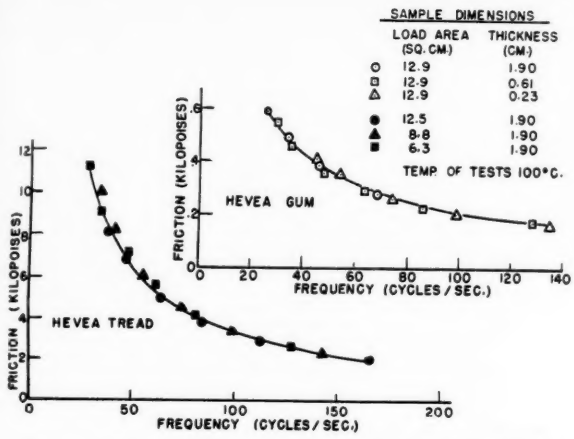

Fig. 11. Internal Friction *vs.* Frequency with Various Sample Shapes (Firestone Resonance Vibrator)

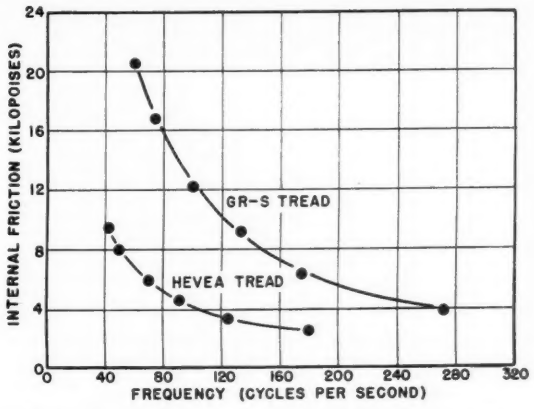

Fig. 12. Internal Friction *vs.* Frequency-Temperature of Test 40° C., Impressed Periodic Force 1,000 Grams, Thickness of Test Sample 0.75-Inch

R′, but it is possible to obtain G from the measured natural radian frequency p_0 and η_i can be calculated from the approximate relation

$$\eta_i = \frac{q'Ip_0}{\pi} \ln \frac{\theta n}{\theta n + 1} \qquad (24)$$

The possibility of measuring both η_i and G by the free vibration method gives definite advantage over the impact resilience technique. However the method is by no means simple since an accurate autographic recording of successive amplitudes is usually necessary, and, in general, the natural frequency is not the same for different stocks, depending on the dynamic modulus G. Since values of η_i have absolutely no meaning unless comparisons are made at the same frequency and since the empirical relationship $p_0\eta_i = \text{const.}$, found for forced vibrations at higher frequencies, is by no means well established in the low frequency range of free vibrations, interpretation of values of η_i obtained in free vibration is difficult. Furthermore the range of damped amplitudes observed with a single type of free vibration test is rather large, and the variation of η_i and G with amplitude often introduces serious error. In general, it may be said that reasonably accurate results can be obtained by the free vibration method when η_i is reasonably small, but with η_i large, as in the case of GR-S type polymers, results are erratic and misleading.

Forced Vibration: Resonance Methods

The resonance method is performed with apparatus which is essentially a mechanical circuit consisting of the rubber sample of stiffness s, a mass M, and a periodic impressed force, F cos pt. The circuit is tuned to resonance by varying either the mass or the impressed frequency so that $s \approx Mp_0^2$, where p_0 is the natural radian frequency. The resonance amplitude is $X_0 = F/p_0b$, where b is the coefficient of the velocity term in the differential equation. (See equation 7.) s is related to the dynamic modulus, and b to the internal friction by a constant of proportionality q, which depends on the geometry of the system. The sinusoidal impressed force may be either mechanical or electrical

An example of a mechanically driven resonance vibrator is that of Kosten (8, 21), which is illustrated in Figure 5. The apparatus was driven by "off-axis" masses m which were rotated at radian frequency p. There actually were pairs of such masses, rotated in opposite senses to eliminate horizontal forces. The vertical centrifugal driving force (compressional) was then $4mp^2r \cos pt$, where r was the off-axis distance of the masses m. The samples could be compressed by means of a stiff spring the force of which, added to the mass M, constituted the constant static load. The system could be tuned to resonance by varying the mass M or altering the driving frequency. Kosten employed the angle of loss δ defined by $\tan \delta = p_0b/s = p_0\eta_i/E$. He found that $p_0\eta_i$ and E were nearly independent of frequency, and thus δ is independent of frequency and is analogous to the angle of loss employed in electrical measurements.

This type of apparatus has also been employed by Gehman (9) in a comprehensive study of the effect of "shape factor" on η_i and E. The method is effective for the study of large rubber samples or complete assembled vibration dampers. The fact that the centrifugal driving force increases with frequency is a distinct disadvantage when attempting to make measurements at either constant force or constant amplitude. The method is thus not suitable for hysteresis evaluation of synthetic polymers. Fletcher and Schofield (22) have used the method to investigate the dependence of dynamic properties of synthetic rubbers on temperature. An interesting illustration of its usefulness in an engineering application of rubber is described by Zdanowich and Moyal (23) in connection with the development of rubber dampers for the suppression of torsional vibrations.

The first published method which employed electrically-forced vibrations was that of Naunton and Waring (3). Their apparatus (Figure 6) was driven by the output of a vacuum tube oscillator which was connected to a coil attached to a mass M. The coil was located between the poles of a permanent magnet. Oscillations of the mass M caused the two statically compressed rubber samples to execute compressional vibrations about the static compression. The static compression was regulated to give a static stress of 2Kg/Cm². The dynamic amplitude was measured with an electromagnetic pickup. Measurements of η_i and E were made over a wide range of frequencies (80 to 500 cycles/sec.). Unfortunately the driving mechanism was attached rigidly to a heavy base plate "to avoid great transmission of vibration." This practise, of course, resulted in exactly the opposite condition: appreciable energy was transmitted to the supports. This condition may explain some of the erroneous results obtained: increase of E with frequency, maxima in the resilience *vs.* frequency curves, etc.

The Goodyear resonance vibrator (6, 11) constitutes a considerable improvement over that of Naunton and Waring. (See Figures 7 and 8.) As in the case of

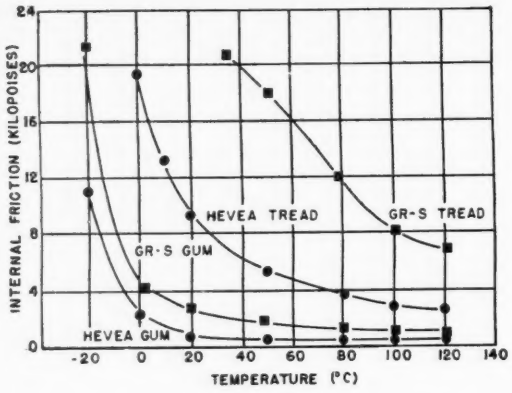

Fig. 13. Internal Friction vs. Temperature (Firestone Resonance Vibrator)

Naunton and Waring's apparatus, compressional vibrations are used, but the equilibrium position is one of constant static deflection rather than constant static load. Amplitudes are measured directly by means of a traveling microscope or projected on to a ground-glass screen. The whole system is mounted on a sponge rubber pad which effectively prevents appreciable energy loss to the table. The driving power is taken from the 60 cycle/sec. mains through an autotransformer or from a variable frequency oscillator. The impressed force is measured by the current through the coil; the force *vs.* current relation is determined by calibration with direct current. Thus the static modulus E_{st} can also be measured with direct current. The system is usually tuned to resonance at 60 cycles/sec. by varying the mass M, and E and η_i are calculated from the resonance conditions; $E = Mqp_0^2$ and $\eta_i = qF/p_0X_0$. It is also possible to calculate the "Dynamic resilience" $R = e^{-2\pi p_0 \eta / E}$ as well as the heat generation per cycle to be expected in rubber products:[4]

$$H = \frac{\pi p \eta_i X^2}{q} = \frac{\pi q p \eta_i F^2}{(E - Mqp^2)^2 + p^2\eta_i^2} \qquad (17a)$$

Gehman, Woodford and Stambaugh (6) showed with this apparatus that the variables $\eta_i p_0$ and E are nearly independent of frequency, in agreement with the results of Kosten (8). The values of η_i and E depend on the shape of the test piece and the static deflection in the manner to be expected from static deflection experiments (24). Both η_i and E decrease with increasing amplitude, but, by making measurements at approximately the same amplitude and the same frequency, very precise measurements may be made which give reliable relative values of the hysteresis defect η_i for various stocks, especially when measurements are made at elevated temperatures (25).

The Firestone resonance vibrator (7) is similar to the Goodyear apparatus except that the rubber samples are vibrated in simple shear. (See Figures 9 and 10.) The samples are subjected to a 15% static compression at right angles to the shear motion. The amplitude is measured by means of an optical lever. The light from a fixed source is reflected from a moving concave mirror to form an illuminated line on a transparent scale. When a direct current is passed through the coil, the movement of a spot of light on the scale gives the static deflection and allows calculation of the static shear modulus G_{st}. The rubber samples are enclosed in a small air oven,

[4] See equation 17, p. 64.
[5] See equation 7, p. 63.

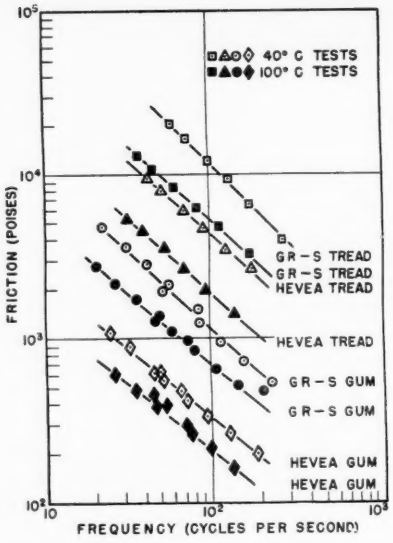

Fig. 14. Log-Log Plots of η *vs.* Frequency—GR-S and Natural Rubber Gum and Tread Stocks

the temperature of which is controlled for half the control cycle of a recorder-controller by means of a small thermocouple junction located at the center of one of the rubber samples with wires in a single plane parallel to the shear stress. The other half of the control cycle responds to another thermocouple junction just outside the rubber sample. Thus measurements above room temperature are made with nearly constant temperature throughout the rubber samples. Measurements below room temperature are made by passing expanding CO_2 gas into the oven. As in the case of the Goodyear apparatus, stock comparisons are usually made under the resonance condition at 60 cycles/sec., attained by varying the mass M, but a variable frequency oscillator is available for studying the frequency dependence of η_i and G which are defined by the differential equation:[5]

$$\frac{y}{A} M \frac{d^2e}{dt^2} + \eta_i \frac{de}{dt} + Ge = \sigma \cdot \cos pt \qquad (7a)$$

where σ is the maximum shear stress per sample, e is the instantaneous shear strain, A the shear area, and y the thickness of the sample. The solution gives the maximum shear strain as

$$e_{max} = \frac{\sigma}{(G - \frac{y}{A} Mp^2)^2 + p^2\eta_i^2} \qquad (26)$$

or at resonance

$$e_0 = \frac{\sigma}{p_0 \eta_i} ; G = \frac{y}{A} Mp_0^2 \qquad (27)$$

and the heat generation per cycle, per unit volume is:

$$H\sigma' = \frac{\pi p \eta_i \sigma^2}{(G - \frac{y}{A} Mp^2)^2 + p^2\eta_i^2} ; \quad He' = \pi p \eta_i e^2_{max} \qquad (28)$$

(*Continued on page 76*)

Improvements in Gas Mask Faceblanks—II[1]

S. H. Katz[2] and Irving Pockel[3]

A VERY few exceptional faces cannot be fitted so as to prevent leakage of gas without some modification of a standard-size facepiece. These include faces with unusually deep hollows at the temples or cheeks or highly asymmetrical faces resulting from injury or congenital malformation.

Fitting Unusual Shapes of Faces

Hollows at the temples may be fitted by shaping a wad of cloth or sponge rubber, putting it under a buckle tab at the temple position so as to press the faceblank against the hollow and stitching the wad to the tab when the size and position have been found correct for the purpose. Both sides of the facepiece should be treated alike. Hollows at the cheek position may be treated similarly, but in this case it may be necessary to add a length of non-elastic webbing on each side of the facepiece, stitched to the buckle tabs at the temple and cheek positions, or to the rubber of the faceblank at the lower position when the arrangement of the cheek tab makes stitching to this member unsuitable. A wad of cloth under the piece of webbing is arranged in suitable size and position to stop leakage at the hollow and then stitched to the webbing. Both sides of the facepiece are treated similarly. Stitching through the rubber of a faceblank should be sealed with rubber cement. In lieu of the methods stated above, pieces of unicelled sponge rubber may be cut to fit the shape of the gap and cemented to the inside of the facepiece.[4]

A few cases of deformed faces have been sent from other branches of the Army to the CWS to be fitted with special individual masks. Laboratory technicians made faceblanks for masks to fit these persons, but production of special masks is not usually practicable.

Mechanical Drawings

The preparation of mechanical drawings for faceblanks has been difficult because of the numerous warped surfaces that must be detailed and the fact that accurate measurements cannot be made from a faceblank itself, except over small portions, because of the flexibility and elasticity of the rubber. It was necessary to prepare a solid core or form from experimental faceblanks made by cutting and patching rubber by stitching, cementing or vulcanizing, and then to obtain measurements from the solid form. Forms were made by casting plaster or cement in a faceblank; minor irregularities that existed in an experimental sample of faceblank were then smoothed out of the form. The major shape and dimensions were detailed from measurements obtained by surveying the form on cross-sectional lines on the surface spaced ½-inch apart.

From the major measurements obtained on a form and from minor measurements including thicknesses obtained directly from a faceblank, mechanical drawings of a faceblank were made. The system until recently emphasized the dimensions of the faceblank and showed only incidentally some dimensions of the core over which a correct faceblank would fit perfectly. Because of difficulties experienced by mold manufacturers in producing faceblank molds from drawings solely for a faceblank and the resultant lack of uniformity among molds made at much expense by different manufacturers, and even among molds made by a single manufacturer, the system of detailing faceblanks was changed so as to give sufficiently exact dimensions to enable production of a core for use in a mold for the particular faceblank. The faceblank itself with minor shapes and thicknesses was then detailed separately. A set of three drawings for the universal-size faceblank for the combat service faceblank E19R52 is illustrated in Figures 1, 2, and 3.

The drawings detailing the cores of molds are equally applicable for use in making forms for inspection of faceblanks. Faceblanks correct in major dimensions should fit such forms perfectly. Thicknesses and some other minor dimensions must be checked separately.

Future Improvements

While experience in the commercial production of molds and faceblanks from drawings detailing the core of each type of faceblank has been limited, it appears that the skill possessed by expert mold makers and especial care on their part can yield accurate molds and faceblanks. Difficulties from inaccurate sizes and shapes should disappear.

The trend in gas mask development had been toward smaller assemblies, lighter in weight. In the United States, gas masks successively developed for service use, without added accessory protective material such as protective ointment, protective covers, and eyeshields, have been:

Gas Mask	Weight Lb.	Date Facepiece Was Standardized
Mask, Gas, Service, M2A2-9A2-IVA1	5	May 8, 1942
Lightweight, M3-10A1-6	3-¾	Aug. 27, 1942
Combat, M5-11-7	3	June 7, 1944
Snout Type, M8-11-10	2-½	Feb. 12, 1944*

* Adopted as substitute standard.

In order to reduce the bulk and weight still further, it appears necessary to eliminate the canister entirely and construct a gas mask with a flexible permeable facepiece having gas absorbing and smoke filtering materials built into the facepiece itself as exemplified by the French gas masks M-2 or the British P helmets,[5] both made of impregnated fabric during World War I. Chemicals were impregnated into fabrics to restrain gas and vapors in the early gas masks, and the fabrics themselves restrained a small portion of smokes; but the capacities and efficiencies were very low compared to requirements for even the lightest modern service gas masks.

The German Volksmaskes were made with air-laid masses of finely divided carbon for gas absorption mixed with fibers for restraining smoke. Although the Volksmaske employed such materials in canisters, they

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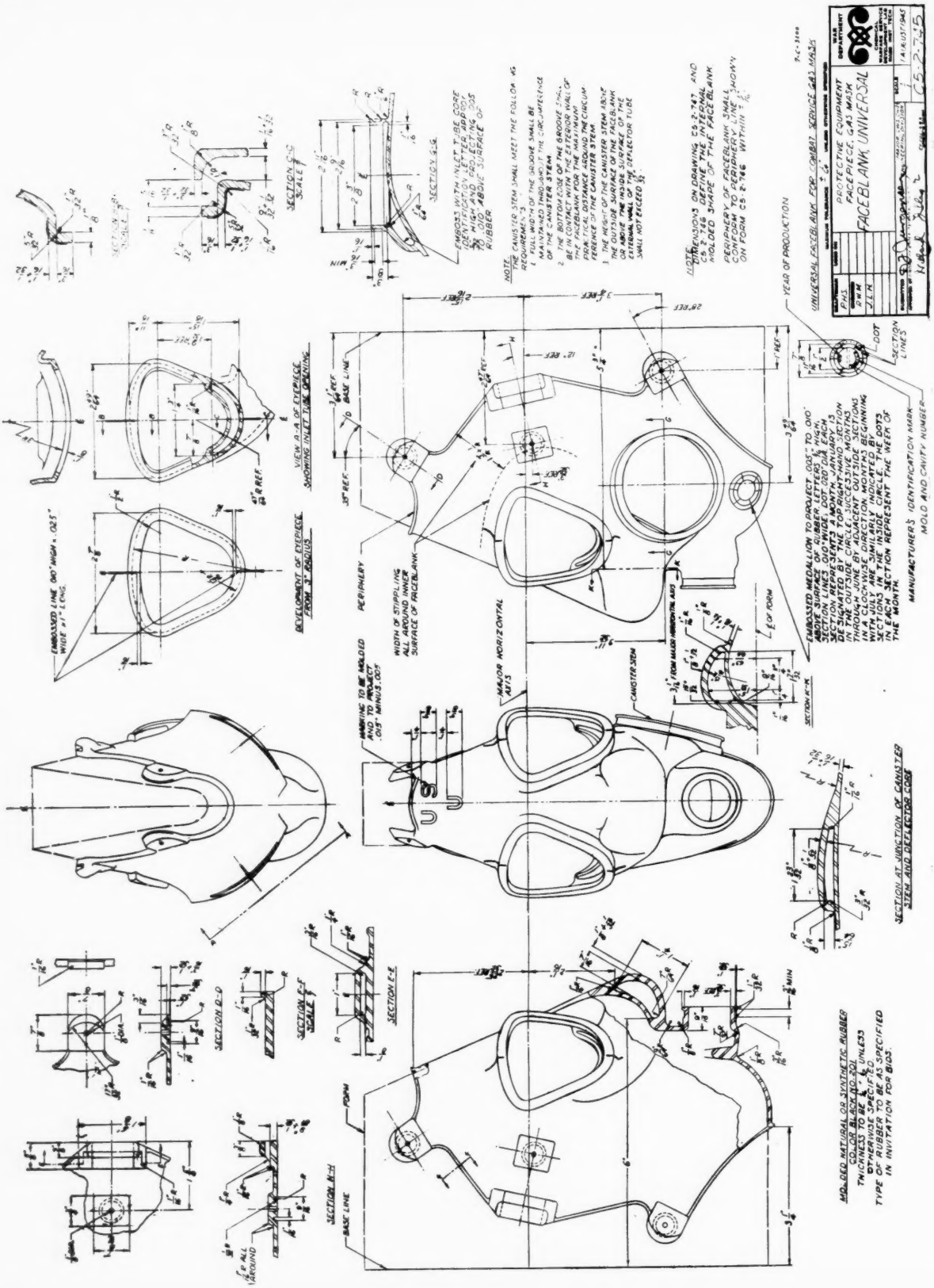
[1] Released for publication by the War Department. Contribution of C.W.S. Technical Command, Edgewood Arsenal, Md.

[2] Senior consultant.

[3] Chief, Defense Materiel Branch, Office of Chief, C.W.S. Present address, Cambridge Industries Co., Cambridge, Mass.

[4] "Fitting of Mask, Gas, Service, Lightweight M3-10A1-6, and Mask, Gas, Service, Combat M5-11-7." War Department Technical Bulletin TB3-205-8, Jan. 3, 1945.

[5] A. M. Prentiss, "Chemicals in War." pp. 536, 539-40. Mc-Graw-Hill Book Co., Inc., New York, 1937.
A. A. Fries and C. J. West, "Chemical Warfare." pp. 197, 200-2. Mc-Graw-Hill Book Co., Inc., 1921.


PROTECTIVE EQUIPMENT
FACEPIECE, GAS MASK
FACEBLANK, UNIVERSAL
UNIVERSAL FACEBLANK FOR COMBAT SERVICE GAS MASK
MOLDED SHAPE OF THE FACEBLANK
PERIPHERY OF FACEBLANK SHALL CONFORM TO FORM CS-2-746 WITHIN ± 1/16
YEAR OF PRODUCTION
SECTION LINES
MANUFACTURER'S IDENTIFICATION MARK
MOLD AND CAVITY NUMBER
EMBOSSED MEDALLION TO PROJECT .035" TO .010" ABOVE SURFACE OF RUBBER LETTERS 1/8" HIGH, SECTION LINES .010" WIDE, DOT .020" DIA. EACH SECTION REPRESENTS 4 MONTH - JANUARY-13 EMBOSSED DOTS ARE SIMILARLY LOCATED IN THE OUTSIDE CIRCLE, SUCCESSIVE MONTHS THROUGH JUNE BY ADJACENT OUTSIDE SECTIONS WITH CLOCKWISE SEQUENCE INDICATED. BEGINNING SECTIONS IN THE INSIDE CIRCLE, THE DOTS IN EACH SECTION REPRESENT THE WEEK OF THE MONTH.
MOLDED NATURAL OR SYNTHETIC RUBBER THICKNESS TO BE .040 UNLESS OTHERWISE SPECIFIED TYPE OF RUBBER TO BE AS SPECIFIED IN INVITATION FOR BIDS.
EMBOSS WITH INLET TUBE SECTION .025 HIGH AND .060 EXTING .035 O.D. ABOVE SURFACE OF RUBBER
NOTE THE CANISTER STEM SHALL MEET THE FOLLOWING REQUIREMENTS
1. FULL WIDTH OF THE GROOVE SHALL BE IN CONTACT WITH THE CIRCUMFERENCE OF THE CANISTER STEM
2. THE BOTTOM EDGE OF THE GROOVE SHALL BE IN CONTACT WITH THE EXTERIOR WALL OF THE FACEBLANK FOR THE MINIMUM AND MAXIMUM DIFFERENCE OF THE CANISTER STEM
3. THE HEIGHT OF THE CANISTER STEM ABOVE THE OUTSIDE SURFACE OF THE FACEBLANK OR ABOVE THE INSIDE SURFACE OF THE EXHALATION VALVE SEAT, IF APPLICABLE, SHALL NOT EXCEED 3/32
NOTE DIMENSIONS ON DRAWING CS-2-747 AND CS-2-746 DEFINE THE INTERNAL MOLDED SHAPE OF THE FACEBLANK
DEVELOPMENT OF EYEPIECE FROM .31" RADIUS
VIEW A-A OF EYEPIECE SHOWING INLET TUBE OPENING
EMBOSSED LINE .007" HIGH x .025" WIDE AT 1 CHG.
PERIPHERY
WIDTH OF STIPPLING ALL AROUND INNER SURFACE OF FACEBLANK
MARKING TO BE MOLDED AND TO PROJECT .015" MINUS .005"
MAJOR HORIZONTAL AXIS
CANISTER STEM
SECTION AT JUNCTION OF CANISTER STEM AND EXCESS CORE
SECTION B-B
SECTION C-C
SECTION D-D
SECTION E-E
SECTION F-F
SECTION G-G
SECTION H-H
BASE LINE
FORM
.12" REF
.31" REF
.21" REF
.33" REF
.33" REF
.28" REF
.33" REF
.33" REF
.33

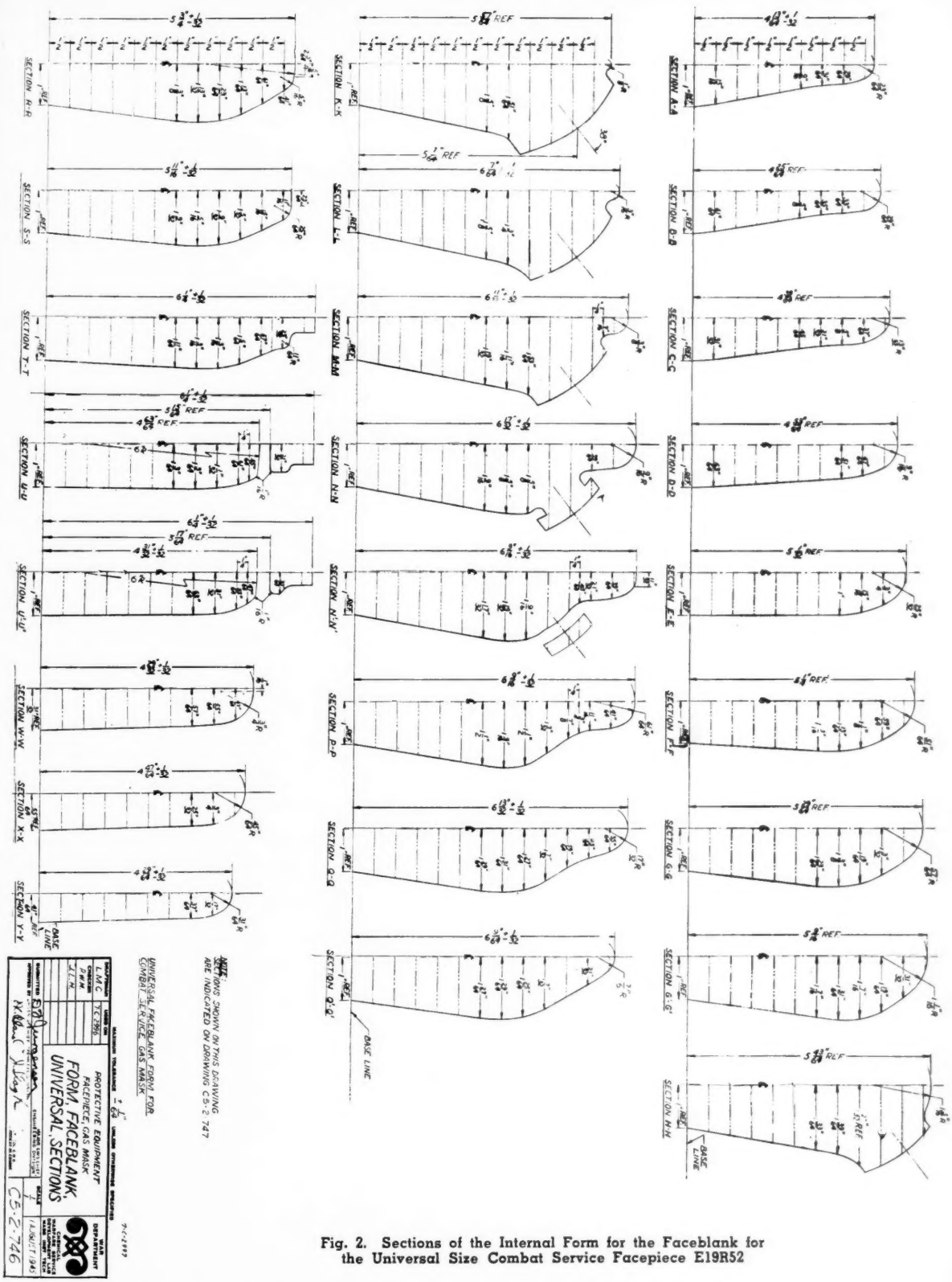


Fig. 2. Sections of the Internal Form for the Faceblank for the Universal Size Combat Service Facepiece E19R52

might be quilted with fabrics for use in construction of permeable protective faceblanks or hoods.

Impermeable faceblanks for gas masks combined with separate canisters do not offer much prospect for further reduction in weight and bulk unless absorbents with greater gas absorbing capacities and effective filter

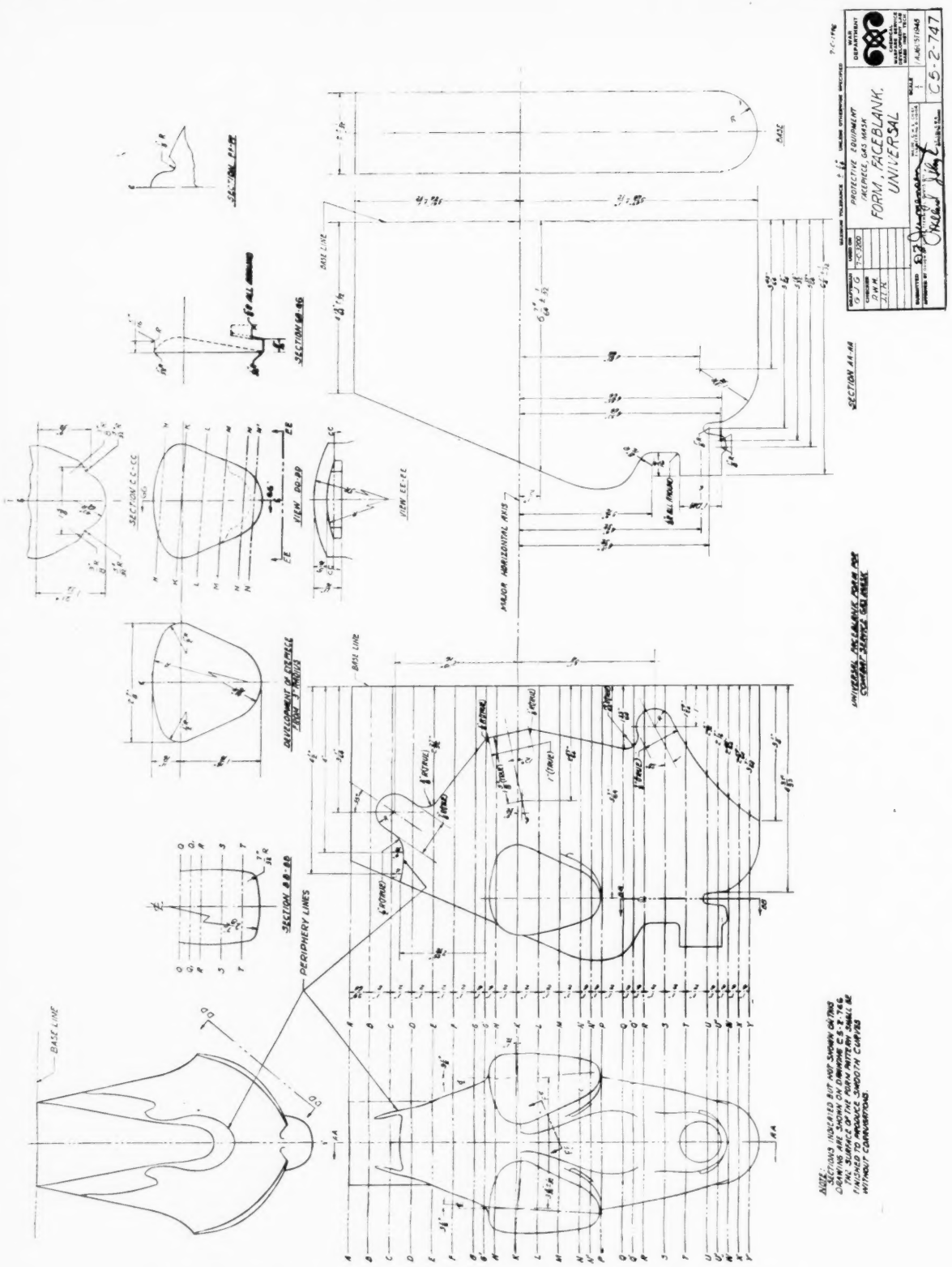


Fig. 3. Form for the Faceblank for the Universal-Size Combat Service Facepiece E19R52

materials with less resistance to air flow can be developed. The present outlook limits reduction in size and weight of gas masks to a type of facepiece that will itself serve as a gas and smoke filter, thereby eliminating the canister. Immediate solution of the problems

(*Continued on page 74*)

Recent Russian Literature on Natural and Synthetic Rubber—XXIII

M. Hoseh

PROSPECTS of Cultivation of *Krym-Saghyz*. G. R. Sepanov, *Kauchuk i Rezina*, 8, 67-69 (1940). **N-29.**

The high yields and good qualities of the rubber produced made the cultivation of *Krym-saghyz* desirable. Another point in its favor is the high yield of seed. Because of its susceptibility to frost, *Krym-saghyz* is now raised in the irrigated areas of the Usbek and Southern Kazakh Republics. Work should be done to refine the present wild plant and also to render it more cold resistant.

Retread Apparatus. V. E. Taruntaev, *Kauchuk i Rezina*, 8, 73-75 (1940). **SN-100.**

A retreader for repairing 6.00-20, 7.00-16, and 7.50-17 tires is described.

Varnishes for Rubber Footwear Using Vulcanized Waste. P. I. Nazarov and V. V. Sher, *Kauchuk i Rezina*, 8, 75-77 (1940). **SN-101.**

Vulcanized NK and SK waste is effectively utilized for the preparation of rubber footwear varnishes. The waste is subjected to (1) thermal treatment, (2) combining the thermally treated product with sulfur, and its dissolution in white spirits, and (3) removal of admixtures. The thermal treatment is carried out at 260-270° C. in an open kettle fired directly. This treatment is continued until a uniform mobile mass is obtained. The combination with sulfur is carried out at 120-150° C. in a varnish kettle. After the product is dissolved in white spirits, the impurities (talc, etc.) are allowed to settle out and are removed by centrifuging. The centrifuge liquid is combined with oil in a mixer at lower temperature. Three kinds of varnishes were tested: one made with pure linseed oil, the other with a mixture of seal oil and rapeseed oil, and the third with a mixture of seal oil, rapeseed oil, and the product obtained from vulcanized waste as described above. The last varnish gave completely satisfactory results when tested for dirt resistance, water resistance, adhesion, and cold resistance. These results proved conclusively that rubber footwear varnish prepared with a product obtained from vulcanized SK waste is satisfactory.

Polybutene Having Rubber-Like Properties. M. A. Lur'e, *Kauchuk i Rezina*, 9, 10-16 (1940). **S-63.**

Polybutenes which range in consistency from oil-like liquids to solid plastic polymers are polymerization products of butene. The latter is produced in oil refining operations, such as cracking and pyrolysis. The properties of polybutenes are reviewed. The plastic rubber-like polymers are a valuable raw material for the rubber industry. The Soviet oil and natural gas industry produces large volumes of butene. The polymerization of butene and its utilization in the synthetic rubber industry are discussed.

How to Improve the Computation of Production Costs. K. A. Korytov, *Kauchuk i Rezina*, 9, 16-20 (1940). **SN-102.**

Successful production is not determined merely by careful technological plans. The flow of raw materials, semi-finished goods and the finished product as well as storage at various stages of production, packing, and shipping of finished goods should also be carefully planned. An outline of time study and flow of materials through the plant is given.

Vulcanization of SK with Fillers and the Structure of the Vulcanizates. A. B. Kusov, *Kauchuk i Rezina*, (1940) 9, 26-33. **S-64.**

The present study concerns vulcanization of SK using fillers and omitting sulfur entirely. The rubber used in these experiments was rodless sodium divinylate having a plasticity of 0.3. The first filler employed was Maikop gas black taken in quantities of 20-120 parts per 100 parts of rubber. The mix was compounded on laboratory rolls until it was uniform. This action required 20-25 minutes. The mix was then passed through a sheeting machine. The sheets, 1.5-2.0 mm. thick, were placed in metallic molds and heated electrically to temperatures up to 220° C.; the time of heating was varied from 10 to 120 minutes. After the predetermined time the molds were taken out, cooled, and the sheets removed. The latter were then tested for their mechanical properties and for the amount of swelling in CCl_4 for 24 hours. In addition the chloroform extract was also determined.

A mix containing 60 parts of gas black per 100 parts of rubber had a tensile strength of 2-3 kg. per sq. cm. (28.5-42.7 psi.), relative elongation 120%, and residual elongation 60%. After heating such sheets for 20 minutes at 200° C., the tensile strength was 50 kg. per sq. cm. (711 psi.), relative elongation 300%, and residual elongation 30%. Specimens of this kind were broken down on breaker rolls, plasticized, and again sheeted. The tensile strength of these sheets was 6-8 kg. per sq. cm. (85.3-113.8 psi.), their relative elongation 100%, and residual 40%. The sheets reheated for 20 minutes at 200° C. had a tensile strength of 60 kg. per sq. cm. (853 psi.), a relative elongation of 350%, and residual elongation of 20%. After repeating the process of breaking down, resheeting, and reheating four to five times, the products had a tensile strength of 90 kg. per sq. cm. (1280 psi.), a relative elongation of 450%, and residual elongation of 15%. After each consecutive heating the specimens became harder, and their break-down and plastification became increasingly more difficult. After the specimens attained a certain optimum of physical properties, their further break-down and resheeting became well-nigh impossible; and upon reheating, their physical properties deteriorated. Best results were obtained with 60-80 parts of gas black per 100 parts of rubber, and neating at 180-200° C. Higher contents of gas black (100-150%) gave hard mixes, having low relative elongation. Decreasing the gas black content to 20-30% lowered greatly the tensile strength. Also, lowering the temperature below 180° C. produced a soft, weak

sheet; whereas raising the temperature above 200° C. yielded a hard sheet having a low relative elongation.

As the physical properties improved in consequence of the above outlined treatment, its coefficient of swelling decreased from 15-20 for the original mix to 1.5 for the product, and the chloroform extract diminished from 12.8 to 5.9%. Similar experiments were carried out also with lamp black, zinc oxide, chalk and kaolin. With these ingredients, too, the mechanical properties of the rubber improved, however not to the extent as with gas black. The experimental results seem to indicate that rubber can be vulcanized with ingredients other than sulfur.

The action of carbon black is attributed to the formation of nodular centers which link together the fibrilar molecules of the rubber hydrocarbon. Making certain assumptions as to size and shape of the carbon black particle, calculations are made of the size of the space lattice formed in the vulcanized rubber. The combined action of sulfur and carbon black, when both are present, is explained by the simultaneous formation of two space lattices, of which the larger is formed by the carbon black particles, and the smaller superimposed on the former is formed by the sulfur particles. If it were possible to separate mechanically the sulfur particles from the rubber in a vulcanizate without the action of oxidizing agents, then vulcanization could be made a reversible process. This has been achieved to a large degree in the vulcanization with gas black where the vulcanizate was restored to a condition closely resembling the original mix.

Use of High-Frequency Currents in the Rubber Industry. A. V. Yermolaev and I. S. Okhrimenko, *Kauchuk i Rezina*, 9, 33-36 (1940). **SN-103.**

The advantages of using high-frequency current for vulcanizing rubber are: the even and quick heating of the entire vulcanized mass; the ease with which the temperature can be regulated by changing the frequency, the potential, or the recipe; the possibility of using all the generated heat for heating the vulcanized article and not wasting heat on heating the mold; reduction in the time required for vulcanization and particularly of large-size objects by as much as tenfold or more; and finally, the ease and cleanliness of the process and the possibility of making it continuous. The authors point to the necessity of research and development in the use of high-frequency currents in rubber vulcanization.

Microscopic Method for Determination of Early Stages of Scorching in Crude Rubber Mixes. E. I. Gorina, *Kauchuk i Rezina*, 9, 37, (1940). **SN-104.**

With a sharp scalpel cut a thin strip from the rubber mix, and from this strip cut off a piece of 0.5-1.0 mm. Place this on a microscope slide and cover with one drop of benzene or other suitable solvent. If the rubber does not dissolve, add one drop or two drops more of the solvent. When the rubber dissolves completely, cover with a cover glass and squeeze. Examine the object in transmitted light at a magnification of 70-100 times. If there are any traces of scorching, they will appear as readily recognizable swelled lumps of "overcooked" rubber.

Lightweight Fillers for Rubber. I. Yu. Mishustin, *Kauchuk i Rezina*, 9, 39-41, (1940). **M-28.**

A number of lightwight materials was tested for their suitability as fillers for rubber used for soles. The purpose was to replace such substances as litho-phone, mummy, ochre, magnesia, and kaolin, the specific gravities of which are 4.2, 3.5, 3.5, 3.2, and 2.4, respectively. The materials tried as fillers were lignin, cellulose, peat, and acetylcellulose, the specific gravities of which are 1.38, 1.34, 1.4 and 1.3, respectively. These substances were tried out by themselves and mixed with other fillers as well as in their natural and activated state. The cellulose was activated by treating it with a 3% soution of HCl or H_2SO_4 for three hours at 100° C. The resulting hydrocellulose was washed free of acid, neutralized, dried at 100° C., and powdered. The lignin was activated by treating it with a 5% solution of Bismarck brown. The lignin, being of acidic nature, was thereby neutralized by the alkaline Bismarck brown. The peat was activated by treating it with a solution of NaOH to extract the pentosanes and was then treated with a solution of H_2SO_4 to dissolve the cellulose, with a solution of sodium sulfite to extract lignin and with a mixture of benzene and alcohol to extract bitumens. The treated and untreated fillers were tested in mixes containing 30% of SK with a plasticity of 0.40. Some of the test results are tabulated below, where *P* designates tensile strength, *L* relative elongation, and *I* set elongation. The indicated quantities of filler are in parts per 100 parts of rubber.

Filler	*P* Lbs./Sq. In.	*L* %	*I* %	Specific Gravity
Cellulose 100	384	94	4.0	1.20
Cellulose 100+kaolin 100	426	69	2.0	1.30
Activated cellulose 100+ kaolin 100	483	142	7.0	1.30
Lignin 100	498	245	8.5	1.20
200	263	97	4.5	1.00
Lignin 100+kaolin 100	370	144	5.5	1.30
Activated lignin 100+ kaolin 100	554	156	5.5	1.30
Activated lignin75+ MgO 125	668	210	8.0	1.35
Activated lignin 50+MgO 50+kaolin 100	796	168	7.0	1.30
Peat 100	185	506	23.0	1.16
+kaolin 100	440	139	6.5	1.30
Acetylcellulose 100	235	194	7.5	0.95

Thus, of the tested fillers lignin activated with a 5% Bismarck brown solution was the best. Vulcanizates made with this material had a 50% higher strength, and specific gravity was reduced by 25%. Activated cellulose was next best; while treated peat proved worthless.

(To be continued)

Gas Mask Faceblanks

(Continued from page 72)

involved and rapid development of a gas mask based on the permeable-faceblank principle is not expected. This faceblank involves long-range development.

Acknowledgment

The contributions of the personnel of many divisions or branches of the Chemical Warfare Service, of the Chemical Warfare Board, and Boards of several other branches of the Army, of rubber manufacturers and mold manufacturers, and other industrial concerns, to improving faceblanks for gas masks are acknowledged. Most improvements and most experimental work were contributed by personnel of the Protective Division of the C.W.S. Technical Command, Edgewood Arsenal, Md., and by the C.W.S. Development Laboratory, Massachusetts Institute of Technology.

OTS Bibliography Reports on Rubber Products—IV

AS EXPLAINED in the June issue on page 373, the United States Department of Commerce began in January, 1946, the issuance and sale of its "Bibliography of Scientific and Industrial Reports," which lists, according to subject matter, information obtained from Germany, Japan, and from countries formerly occupied by these two nations, as well as reports on research sponsored by the U. S. Government. Distributed on a weekly basis by the Superintendent of Documents, Government Printing Office, Washington, D. C., the bibliography is available on a weekly basis for a cost of about $10 a year. In June we began printing abstracts of these reports on rubber products for the benefit of readers of INDIA RUBBER WORLD and will continue to do so as often as space permits. Since June, however, the Office of the Publication Board has been changed to the Office of Technical Services; hence the above title has been changed from OPB to OTS.

U. S. Rubber Reserve Company Government Tire Test Fleet. Final Report on Government Tests on "K," Nos. 28 and 207, Ordinary Cotton, "Wilds" Variety Cotton, and Rayon Cords in Tire Carcasses. PB 2921. 1945. 100 pages. Photostat $7; microfilm $1. A summary of tests comparing the use of standard cotton cord, "Wilds" variety cotton, and rayon cord in tire carcasses is given. In 6.00 by 16 (four-ply) passenger-car tires standard cotton cord is entirely adequate. In 7.00 by 20 (ten-ply), S-4 tires "Wilds" cotton tires showed a superiority over both types of cotton in final mileage. Cotton tires show a slightly better wear rating than rayon tires. The report contains a file of correspondence prior to the manufacture of the tires, and detailed tables and data on the various tests made.

Study by Inter-Agency Committee on the Treatment of the German Rubber and Rubber Products Industry from the Standpoint of International Security. U. S. Technical Industrial Disarmament Committee. (T. I. D. C. Project 7. Preliminary Report, July 14, 1945). PB 4111. 1945. 26 pages. Photostat $2; microfilm 50¢. The general significance of the German rubber and rubber products industry in relation to Germany's war potential is illustrated by numerous facts and figures. From these the conclusion is drawn that, as an essential step toward the elimination of the German war potential, all synthetic rubber plants be completely eliminated and the import of raw or synthetic rubber into Germany be strictly controlled. Under these provisions the German rubber industry may be permitted to continue the production of such rubber products as are necessary for peaceful pursuits. Appendix A gives production and trade statistics; Appendix B, a list of German rubber goods manufacturers. This report was coordinated by the Enemy Branch, Foreign Economic Administration.

Shoepacs, All-Rubber, with Rubber Lining; Comfort, Moisture Disposition and Thermal Insulation of Experimental Item. Richard O. Morris and Agnes M. Galligan. (Quartermaster Corps, Climatic Research Laboratory, Report 4587). PB 3383. 1945. 20 pages. Photostat $2; microfilm 50¢. A report is given of tests on new types of "shoepac" (Army footwear for troops exposed to wet-cold conditions) designed to give greater comfort as well as greater protection against cold and moisture. The new "shoepacs" were made of all rubber construction with a rubber lining and a new design to give more support to the foot and ankle. Laboratory and field tests indicate the superiority of the new models. Tables and illustrations are included.

The Reppe Butadiene Process; Summary Report. C. C. Monrad. PB 4604. 1945. 20 pages. Photostat $2; microfilm 50¢. This report describes the synthesis of butadiene by the Reppe formaldehyde-acetylene reaction. Pilot-plant results are given. This is a technical report from RFC, Office of Rubber Reserve, Research and Development Section.

I. G. Farbenindustrie Synthetic Rubber Plant, Ludwigshafen. Russell Hopkinson and others. PB 4287. 1945. 42 pages. Photostat $3; microfilm 50¢.[1]

Testing of Rubber. M. J. Brevoort. (Edgewood Arsenal Technical Report 33). PB 6254. 20 pages. Photostat $2; microfilm 50¢. This report is a compilation and evaluation of the various rubber testing methods found in the literature. The type of aging test to be selected should be governed by the predominating cause of the deterioration of the rubber in use, it is said. In most tests it is desirable to age the samples with the stockinet (when present) removed. No accelerated aging test has been worked out that can be regarded as a duplicate of natural aging. A bibliography is included.

Rubber Substitutes for Life Rafts. C. J. Brick. (Army Air Forces, Engineering Division, ENG-54-671-162H). PB 5743. 1943. 3 pages. Photostat $1; microfilm 50¢. At a conference in the Naval Aircraft Materiel Center, Philadelphia, October 29-30, 1943, with Army Air Forces, Navy Department, and industry, the use of synthetic rubber in life rafts was discussed. Test results proved that neoprene compounds in use at that time were not suitable for life rafts owing to fabric failure after exposure to temperatures of —65° F. Each of the raft manufacturers represented was to submit neoprene and other synthetic compound rafts for further tests. An industry steering committee was formed to coordinate the efforts to solve the problem.

Rubber Substitutes for Life Rafts. C. J. Brick. (Army Air Forces, Engineering Division ENG-54-671-162K). PB 5744. 1944. 3 pages. Photostat $1; microfilm 50¢. This report is on a conference held with the Office of the Rubber Director, the Bureau of Aeronautics, Materiel Command, and industry, relative to the use of synthetic rubber for use in life raft fabric. The conference was held in New York, N. Y., April 18, 1944. An order to be issued by the Office of the Rubber Director was submitted, which required a reduction in the use of rubber in life rafts by 25%, effective May 15, 1944, and by 68%, effective

[1] See PB 1763, our Aug., 1946, issue, p. 812.

July 1, 1944. Effects of this order were discussed with representatives present.

Rubber Substitutes for Life Vests. C. J. Brick. (Army Air Forces. Engineering Division. ENG-54-671-162F). PB 5742. 1943. 2 pages. Photostat $1; microfilm 50¢. At a meeting in New York with The Rubber Manufacturers Association, Inc., Army Air Forces, Navy Department, and industry, the use of synthetic rubber in life vests and belts was discussed. A complete changeover to synthetics on life belts was ordered accomplished by October 1, 1943. It was agreed, however, that rubber would be made available for these vests until such time as synthetics were proved suitable for use.

Poppet Valve Rubber Diaphragms. C. E. Jaynes. (Army Air Forces. Engineering Division. TSEPL-5-519-211). PB 6889. 1945. 2 pages. Photostat $1; microfilm 50¢. Three samples of poppet valve rubber diaphragms were tested by the Power Plant Laboratory for volume swell. As the % volume swell of the samples tested was 39.7, 36.3, and 39.2, respectively, they do not conform to the volume swell requirements of Bendix Specification ES-0408, which permits a maximum volume swell of 35%.

Test on Carburetor Seal Rings. P. J. Mahoney, (Army Air Forces. Experimental Engineering Section. EXP-M-57-519-80). PB 6743. 1942. 3 pages. Photostat $1; microfilm 50¢. A report of tests made to determine the volume change characteristics of carburetor seal rings after immersion in aromatic fuel, No. P. P. F. 813, and after subsequent drying, is given. The rings were manufactured from synthetic rubbers, one type from neoprene and the other from Hycar. Both types showed a shrinkage after fuel immersion and a 48-hour drying period. A table shows changes due to immersion of the rings tested.

Tire Repair and Retread. U. S. War Department. (Technical Manual, TM 9-1868, May 27, 1943). PB 3301. 1943. 106 pages. Illustrated. Photostat $8; microfilm $1.50. This report comprises a manual covering operation and maintenance of equipment for tire repair and retread and instructions for processing of worn tires and tubes. An appendix contains repair curing schedules.

Comparative Tests on Samples of Reclaimed Rubber and Vinylite. William Perry. [Army Air Forces, Experimental Engineering Section EXP-M-59-681-62-(1)]. PB 7875. 1942. 2 pages. Photostat $1; microfilm 50¢. Tests for tensile strength, elongation, Shore hardness, and permanent set on reclaimed rubber and Vinylite are presented in tabular form.

(to be Continued)

Hysteresis and Methods

(Continued from page 68)

which becomes at resonance

$$H_0' = \frac{\pi\sigma^2}{p_0\eta_i} = \pi p_0 \eta_i e_0^2 \qquad (29)$$

It should be noted that G is the dynamic shear modulus, and η_i, the internal friction, which is defined as the viscosity of the test piece, i.e., η_i = viscous restoring stress/rate of shear. G and η_i decrease with increasing static compression (at right angles to shear stress), since the slope of the stress-strain curve decreases with increasing strain in the vicinity of the origin. However G and η_i do not depend on either the size or shape of the samples, over a wide range, provided the static compression is maintained constant. This is an important advantage for the shear method since, by choosing several different sample shapes of a given stock, a wider range of resonance frequencies may be obtained, and very small samples may be employed without seriously reducing the amplitudes. In Figure 11 the variation of η_i with frequency is given, using radically different sample shapes. The ability to make precise measurements on samples as small as 0.5-gram (total stock required = one gram) is applied in evaluating experimental polymers where only a few grams of polymer are available for a complete set of physical tests.

The dependences of internal friction and modulus upon frequency and temperature are very similar to those found with the Goodyear apparatus (6). (See Figures 12, 13.) In agreement with Kosten (8) and Gehman (6) et al, G and $p_0\eta_i$ are found to be only slightly dependent on frequency. However log-log plots of the type shown in Figure 14 indicate that $\eta_i = kp_0^{-n}$, where k and n are constants for a given stock at a given temperature. For tread and gum stocks based on a wide range of different polymers, n has been found to vary from 0.78 to 1.00.

Moyal and Fletcher (26) found that resilience values calculated from forced resonance amplitudes agreed satisfactorily with those calculated from the damping of free vibrations of the same system.

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(To be continued)

EDITORIALS

Natural Rubber Slows Reconversion Rate

WHEN the war with Japan ended over a year ago, the rubber industry was particularly fortunate in being able to reconvert to the production of civilian goods with a minimum of shutdowns and with a lot less drastic changes in its production lines than those which were necessary with most of the other major industries of the country. With the cancellation of orders for military tires, the tire branch of the industry simply started building tires for civilians, and to a considerable extent the change from making other types of rubber products for the military to making them for civilians was just as easy. Consequently the rubber industry during the first year following V-J Day established new records in its rate and volume of production of goods for civilians.

Recently, however, because of the greater than expected increase in the amount of natural rubber that has become available from the Far East and the action of the Civilian Production Administration in increasing its allocations of this rubber to industry from about 11,000 tons a month at the beginning of 1946 to around 15,000 tons a month by mid-1946, and then to over 30,000 tons a month for the last half of 1946, processing problems have increased with this reconversion to larger and larger amounts of natural rubber to the extent that, paradoxically enough, productive efficiency has been reduced. The quality and types of natural rubber delivered to the industry are not the same as prewar, and since allocations at the present time contain a larger proportion of tough grades as well as grades of lower quality, not only processing efficiency, but end-product quality has declined somewhat.

It is an unfortunate commentary on the conditions that the rubber industry has had to face during the past several years that in 1943, when it had to convert to the use of synthetic rubber, it would have done almost anything to obtain relief from the shortage of natural rubber, but now that the industry can use almost as much natural rubber as it wants, the same type of difficulty is experienced as when it was necessary to use only synthetic rubber. The improvement in quality of synthetic rubber during the past three years and the improvement in the industry's ability to handle this rubber in the manufacture of tires and other rubber goods make the return of natural rubber, at least of the present quality and types, less of a boon than the consuming industry expected.

Latest reports from the Far East confirm previous estimates that a much larger proportion of the rubber from this area than prewar will be that produced by the native smallholders, and therefore the return to the high quality and unrestricted availability of all grades will probably not be realized for some little time.

In view of these facts and with the greater difficulty in maintaining product quality that may be experienced during the next several months, it is suggested that the rubber industry might well undertake a campaign to acquaint the public and its customers with the existing situation as it affects the supply, price, and quality of the rubber products sold during this temporarily more difficult period. This "good will" campaign would seem to be of particular value at this time. During the war years and up to the present time, the public and the consumer have been told not once, but many times, of the high production rate of the rubber industry, of the steadily increasing quality of synthetic rubber as produced and of the goods made from it. Any large number of failures to secure the reported service from currently produced goods will place the blame on synthetic rubber and its users, where it does not belong.

It might be well to let the public have all the facts rather than risk the possibility of the loss of good will for the producers of synthetic rubber, natural rubber, and of goods made from both rubbers.

"Lest We Forget"

DURING the entire history of the rubber industry in this country there has always been, of necessity, a reclaim and scrap rubber industry. In the early years of the late war, if it had not been for the rubber reclaiming industry, with our diminishing supply of natural rubber and before general-purpose synthetic rubber was available in quantity, our military and civilian war effort would have been retarded severely. In war or peace the use of reclaimed rubber in proper proportion to natural or synthetic rubber has always given the manufacturer of rubber products and the consuming public more and better goods at a lower price.

The Second Report of the Government's Inter-Agency Policy Committee on Rubber discusses at some length "Possible Methods of Government Support" for the synthetic rubber industry and recommends that the best method of government support may be the use of product specification or subsidy, or a combination of both. With regard to the reclaim industry, it adds:

"The Committee assumes that, in considering the form of support it might wish to give synthetic rubber, the Congress will take into account the legitimate claim of the reclaim industry not to have its product unduly discriminated against."

What else would result from continued government product specification requiring certain amounts of synthetic rubber or a synthetic rubber subsidy, or both, but discrimination against the reclaim industry?

Admittedly, a national security minimum production of synthetic rubber regardless of cost is essential, but such a minimum for reclaimed rubber is equally essential. A free market for all rubbers would seem to be the best solution.

Scientific and Technical Activities

The One Hundred and Tenth Meeting of the American Chemical Society

THE 110th, or Fall, 1946, meeting of the American Chemical Society, held at Chicago, Ill., September 9 through 13, had an attendance of more than 9,000, of which about 800 were present at the meetings of the Division of Rubber Chemistry. The High Polymer Forum, sponsored at this meeting by the Division of Physical and Inorganic Chemistry assisted by the Divisions of Cellulose; Colloid; Organic; Paint, Varnish and Plastics; and Rubber Chemistry, was again a feature of this meeting. The High Polymer Forum held sessions on Tuesday morning and afternoon and Wednesday morning and afternoon, September 10 and 11, respectively. H. I. Cramer, secretary of the Division of Rubber Chemistry, presided at the Tuesday afternoon session of the High Polymer Forum.

The General Meeting of the Society

The general meeting of the Society took place the evening of September 11, at the Medinah Temple, with Bradley Dewey, A.C.S. president, presiding. The theme of this meeting, following the presentation of the various awards of the A.C.S., including the Priestley Medal to Roger Adams, of the University of Illinois, was atomic energy.

Dr. Adams, in accepting the Priestley Medal, highest honor in American chemistry, discussed "The Future of German Industry." Germany's industry must be revived, even at the risk of restoring her war potential, or the whole European economy will face collapse, he warned. In addition to the crippling curtailment of heavy industry, most vital part of the country's industrial life, the Allies' delay in carrying out the Potsdam agreement to treat Germany as an economic unit is wreaking havoc in all four occupation zones. If the Allied plan for German industry is enforced and fails to provide a balanced economy by 1949, a dangerous swing to the other extreme of excessive leniency may result. M. S. Szymczak, of the Federal Reserve Board, recently named by President Truman as director of rehabilitation of German economy in the American zone, has an "extraordinarily important, but unenviable task before him," Dr. Adams declared.

On the subject of atomic energy, Charles A. Thomas, vice president, and technical director of Monsanto Chemical Co. and project director of the Monsanto Clinton Laboratories at Oak Ridge, Tenn., spoke on "Peacetime Applications of Atomic Energy." Atomic power for peacetime industrial use can be produced at a cost roughly comparable to coal power cost, he said. Three broad applications for atomic power which were outlined by Dr. Thomas were: nuclear power plants which would make feasible a greater decentralization of industry; nuclear power plants which will aid the industrial development of isolated parts of the world where the cost of oil, gas, or coal is prohibitive and where a supply of water is unavailable; and the nuclear power plant, in connection with the modern gas turbine, which might be desirable as operating or standby plants to existing large utilities.

Bradley Dewey, in his talk, "The Atomic Bomb and Common Sense," emphasized that the atomic bomb is not "just another weapon," in the sense of the military axiom that for every weapon there is a counter measure. Once delivered there is no defense against it. It is devastating over an area of several square miles, he said, and it is a super-weapon, the first super-weapon. Because the atomic bomb is a super-weapon it does not follow that we must hold that it means the extinction of civilization, Colonel Dewey added. It could mean shorter wars and wars less destructive to our civilization. A nation sure of its own freedom from the temptation to wage aggressive war, which has a supply of atomic weapons and the means—airplanes, rockets, or guided missiles—to deliver them, can rest assured that any other nation will hesitate to wage war against it with or without atomic bombs. It can very well be that such a nation can, by its mere possession of atomic weapons, insure the peace of the world.

David E. Lilienthal, chairman of the Tennessee Valley Authority and one of the authors of the State Department's recent "Report on the International Control of Atomic Energy," spoke on "How Can Atomic Energy Be Controlled?" Mr. Lilienthal first referred to the work of the Atomic Energy Commission of the United Nations which has been meeting in New York, N. Y., since June 14 seeking an answer to the international control of atomic energy and added that unless an answer acceptable to this country and Russia and the other nations can be found, then we are bound to have a feverish arms race. As scientists and technical men—prominently among them chemists—gave the world the large-scale release of atomic energy, it is his opinion, Mr. Lilienthal said, that the only hope to control atomic energy and prevent its use for destruction lies in applying the scientific spirit and the scientific method to this problem. The proposals of the report of the Atomic Energy Commission for the formation of an Atomic Development Authority were reviewed, and it was emphasized that this latter organization would not be a mere international detective force, but, as its proposed name implies, it would be a development agency engaged in operations and extensive research. There is an even more important, though perhaps less obvious, reason why the agency should be more than a policing force, Mr. Lilienthal said, quoting from the report:

"To be genuinely effective for security the plan must be one that is not wholly negative, suppressive, and police-like . . . It must be one that will tend to develop the beneficial possibilities of atomic energy and encourage the growth of fundamental knowledge, stirring the constructive and imaginative impulses of men rather than concentrating on the defensive and negative. It should, in short, be a plan that looks to the promise of man's future well-being as well as his security."

The Rubber Division Meeting

About 800 members of the Division of Rubber Chemistry were present in Chicago for the technical sessions, banquet, and other activities of this Division. W. A. Gibbons, of United States Rubber Co., chairman of the Division, opened the technical sessions on Wednesday afternoon, Sept. 11, with some comments on the continued growth of the Division and its increasing interest in a larger and larger number of subjects. He suggested that the Division will be concerned in the future with the chemistry of all kinds of rubber, both natural and synthetic. The continued increase in both the number and the size of local rubber groups and the value of the closer relations of the Division of Rubber Chemistry with these groups were also mentioned.

The abstracts of all of the papers presented before the Division, with the exception of the Charles Goodyear Medal Address, given on Thursday morning, September 12, by Ira Williams, of J. M. Huber, Inc., were published in our August issue. An abstract of this special paper, which had as its title, "The Vulcanization of Rubber with Sulfur," as prepared by Dr. Williams, is given below.

Abstract of The Charles Goodyear Medal Address

"The vulcanization of rubber with sulfur is a chemical process insofar as it depends on the chemical combination of the sulfur, but the manner of combination of sulfur is not known definitely. The reaction of sulfur with the rubber is maintained at a constant rate due to the activating effect of sulfur already combined which aids the attack of sulfur on methylene carbon atoms. Such attack is probably destructive to the rubber.

"The rubber molecule, in itself, differs in the sequence of methyl groups and double bonds, depending on the direction of passing along the carbon chain. It is suggested that equal numbers of chains run in each direction and that natural rubber is formed under such conditions that the opposed double bonds in adjacent molecules are paired. This pairing of double bonds is responsible for stability and loss of double bond characteristics by the rubber. Oxygen will not attack rubber until this pairing is disturbed.

"Various types of resonance can contribute to the ability of electrophilic materials, such as sulfur, to attack rubber. Resonance within the double bond which may be responsible for the association of unvulcanized rubber is probably of little importance in directing the attack by sulfur. The resonance due to hyperconjugation between the methyl group and the double bond can occur in natural rubber, but in none of the butadiene synthetics. This type of resonance, while being harder to initiate, can be more completely developed than resonance to activate methylene carbon atoms and will promote the attack by sulfur on the doubly bonded carbon atom not attached to the methyl group. This resonance effect is promoted by nucleophilic

substances such as strong acids. The thioketone which would result would form a more permanent dipole and promote stronger association either through electrostatic forces or through hydrogen bonding.

"The strong association between sulfurized rubber molecules can be reduced by nucleophilic substances such as piperidine, and the vulcanized rubber can be brought into a relatively non-viscous solution. Removal of the peptizing agent and solvent results in reassociation of the rubber and redevelopment of insoluble vulcanized rubber.

"The function of soluble zinc salts has not as yet been determined. Werner-type complexes formed between accelerators and zinc could tend to regulate the nucleophilic properties of the accelerator within a more effective range.

"The study of vulcanization should be encouraged particularly because of its importance to the synthetic rubber industry. The natural rubber industry developed as an art largely because of the adaptability of the natural product. Most synthetic rubbers, other than chloroprene polymers, refuse to vulcanize satisfactorily in the absence of large amounts of powders. Perhaps the present synthetics will be vulcanized satisfactorily in the future. It is certain that a better understanding of the process by which natural rubber is vulcanized would assist in finding better methods of vulcanizing synthetics and in formulating synthetics which are more vulcanizable."

The Business Meeting

At the business meeting of the Rubber Division on the afternoon of September 12, Dr. Gibbons first called on C. A. Bartle, of E. I. du Pont de Nemours & Co., Inc., chairman of the nominating committee, for his report on the results of the letter-ballot election of officers for the coming year. The new officers of the Division, as announced by Mr. Bartle, are: chairman, W. W. Vogt, Goodyear Tire & Rubber Co.; vice chairman, H. E. Outcault, St. Joseph Lead Co.; secretary, C. R. Haynes, Binney & Smith Co.; treasurer, C. W. Christensen, Monsanto Chemical; and sergeant-at-arms, L. M. Baker, Mansfield Tire & Rubber Co. New directors are: G. L. Allison, B. F. Goodrich Co.; A. M. Neal, du Pont; and G. H. Swart, General Tire & Rubber Co. Additional new directors in accordance with the by-laws of the Division are, of course, W. A. Gibbons, the outgoing chairman; and R. A. Schatzel, Rome Cable Corp., the defeated nominee for vice chairman.

Dr. Gibbons, as the retiring chairman of the Division, expressed his appreciation to the members of the Division, the directors, and other officers for their fine cooperation and support during the period of his term of office. He then also expressed his appreciation most particularly to Dr. Cramer, the retiring secretary, and suggested a rising vote of thanks by the membership, which was enthusiastically given.

The report of the chairman of the membership committee, Mr. Outcault, was next presented, revealing that since the last report given at the April meeting, applications had been received for 80 active and 10 associate members as a result of the work of this committee. The total membership of the Division at present consists of 1,351 active and 267 associate members, making a grand total of 1,618 members.

W. W. Vogt

The new chairman of the Division, W. W. Vogt, was presented to the membership and, as part of his remarks, made mention of the luncheon on September 13 of the executive committee of the Division with the officers of the local rubber groups, at which, under the new by-laws of the Division, the matter of the more active collaboration of the Division with the local rubber groups was to be discussed. Mr. Vogt, as vice chairman of the Division, has had as part of his duties the responsibility for the liaison between the Division and the local groups. During the next year these duties will be assumed by Mr. Outcault, the new vice chairman.

Among the subjects discussed at this luncheon with the officers of the local rubber groups, was the means by which, because of better contacts between the local groups, conflicts on speakers' dates will be avoided. During the coming year, it was also decided to obtain more speakers and have more discussion on the problems of the processing and handling of rubber than on any other subject, because of the greater importance of this subject at the present time.

The Division Banquet

Much credit must be given to the local committee on arrangements headed by F. S. Frost, Jr., of Frost Rubber Works, for its very successful handling of the details of housing, registration, and most particularly the banquet of the Division, held September 12 in the ballroom of the Hotel Sherman. The excellent meal and outstanding entertainment provided, the latter around the theme of "A Night at the Circus," will be remembered as one of the highlights of the Chicago meeting.

Attendance at the banquet was about a thousand members and guests, and among those present at the speakers' table, in addition to the officers and directors of the Division, were Alden H. Emery, secretary and business manager of the A. C. S., and Walter H. Murphy, of the A. C. S. publications, *Industrial and Engineering Chemistry* and *Chemical and Engineering News*.

The High Polymer Forum

The program of papers given before the High Polymer Forum was not available for our August issue, in which the program of the Division of Rubber Chemistry and abstracts of papers presented before this Division were given. This Forum program is therefore included in this report, together with abstracts of certain of the papers considered of special interest to readers of INDIA RUBBER WORLD. This program of the Chicago meeting was sponsored by the Division of Physical and Inorganic Chemistry, and H. Mark, of the Polytechnic Institute of Brooklyn, was in charge of the program for the Forum. Officers of the other Division collaborating in this program assisted Dr. Mark and presided at various of the several sessions Tuesday and Wednesday morning and afternoon.

PROGRAM OF HIGH POLYMER FORUM
September 10—Morning Session
H. Mark, Presiding

Introductory Remarks. H. Mark.

Intramolecular Reaction in Polycondensations. I. The Theory of Linear Systems. H. Jacobson, Columbia University, New York, and W. H. Stockmayer, Massachusetts Institute of Technology, Cambridge, Mass.

Double Refraction in Systems Containing Kinked Chain Molecules. Werner Kuhn, University of Basel, Switzerland.

The Distribution of the Molecular Weight of Nylon as Determined by Fractionation in a Phenol-Water System. Guy B. Taylor, du Pont, Wilmington, Del.

The Effect of Molecular Weight Distribution on the Viscosity-Concentration Coefficient. W. E. Davis, Hercules Powder Co., Wilmington, Del.

Application of Corrections in the Viscometry of High Polymer Solutions. R. H. Wagner, Kodak Research Laboratories, Rochester, N. Y.

September 10—Afternoon Session
H. I. Cramer, Presiding

Further Relations Concerning the Mechanism of Emulsion Polymerizations. William D. Harkins, University of Chicago. (Work done in connection with the Government Research Program on Synthetic Rubber under contract with the Office of Rubber Reserve, RFC.) Monomer molecules diffuse from the surface of the monomer droplets through a thick diffusion layer into (1) the aqueous phase, in which some polymer particle nuclei are initiated, (2) soap micelles, in the monomer cores of which most of the particle nuclei are initiated, and (3) polymer particles, after they are initiated in (1) or (2). Locus 3 is responsible for the production of almost all of the polymer.

The soap micelles disappear rapidly by adsorption of their molecules at the interface monomer-polymer particle-aqueous phase; so they disappear, and this locus disappears at about 13% conversion with 5% as much soap as monomer. The number of free radicals in any polymer-monomer particle (or monomer emulsion droplet) seems to be small and practically independent of particle size; so the rate of reaction depends mostly upon the number of these particles initiated and is therefore almost proportional to the initial amount of soap per unit amount of monomer. At about a 60% yield all of the monomer has been dissolved in the latex particles, and below this also the monomer-polymer ratio increases with decrease of yield. The quantitative relations are dependent upon the initial ratio of

soap to monomer, and other factors Very little polymer is formed in the monomer emulsion droplets, owing to the small number of free radicals present.

Initiation and Growth of Butadiene Resinous Polymers. L. M. Welch, M. W. Swaney, R. F. Howe, A. H. Gleason, and R. K. Beckwith, Standard Oil Development Co., Elizabeth, N. J., and Standard Oil Co. of N. J. (Louisiana Division), Baton Rouge, La. The spontaneous formation of an insoluble, infusible butadiene "popcorn" polymer has been encountered in some of the commercial distillation units which are used to purify butadiene for the synthetic rubber program. In the laboratory the initiation of "popcorn" polymers has been effected in a variety of ways. Peroxides or moisture and iron in the presence of butadiene monomer at 50°C. cause "popcorn" polymer formation within a few days. In the absence of catalysts, oxygen, or metals, no "popcorn" formation was observed in tests of two months' duration.

Once initiated, the polymer grows autocata'ytically and shows a logarithmic growth in butadiene monomer. This is interpreted to mean that all portions of the polymer are accessible to the monomer and are in active growth. Active oxygen or other catalysts are not required in the growth process. Exposure of polymer "seeds" to the atmosphere for prolonged periods causes a decrease in their rate of growth, but does not render them inactive.

Various substances of different chemical nature were studied to determine their inhibiting action on "popcorn" polymer growth. Oximes and vulcanization accelerators are among the most effective growth retarders; whi'e conventional antioxidants have little effect.

A Study of Reaction of Buna Rubbers with Aliphatic Mercaptans. G. A. Serniuk, F. W. Banes, and M. W. Swaney, Standard Oil Development.[1]

Regulator Theory in Emulsion Polymerization. Wendell V. Smith, U. S. Rubber, Passaic, N. J. Experimental data on the rates of mercaptan reaction in both emulsion polymerization and oil-phase polymerization of the three systems, *tert*-butyl mercaptan in styrene, *n*-amyl mercaptan in styrene, and *n*-amyl mercaptan in methylmethacrylate, are presented. In each of these three systems the relative rates of mercaptan to monomer reactions are practically identica' in emulsion polymerization and oil-phase polymerization. The intrinsic viscosities obtained on these regulated polymers have been interpreted by the chain transfer theory of regulator reaction.

The effect of the chain length of aliphatic mercaptans on their regulating action in the emulsion po'ymerization of styrene and butadiene is discussed. It is found that the rate of reaction of regulator relative to that of monomer for the lower molecular weight mercaptans is practically the same in emulsion polymerization as the relative rate in oil-phase polymerization. For higher molecular weight mercaptans, however, this reactive rate is less than the corresponding oil-phase rate, which point is interpreted as indicating that the rate of diffusion of the high molecular weight mercaptans through the aqueous phase is a controlling factor in determining the rate of regulator reaction.

The rate of reaction of a regulator during the copo'ymerization of two monomers will be discussed theoretically. An experimental investigation of the rate of reaction of *n*-amyl mercaptan in the emulsion copolymerization of styrene and methyl methacrylate gives satisfactory agreement with this theory.

Emulsion Copolymerization of Isoprene and Styrene. A. J. Johanson and L. A. Goldblatt, United States Department of Agriculture, New Or'eans, La.[2]

Some Studies of the Emulsion Polymerization of Styrene. R. L. Guile and R. C. Huston, Michigan State College, Lansing, Mich. The object of this study was to determine the effect of different catalytic systems on the molecular weight of polystyrene as prepared in an emulsion system of uniform composition. The catalytic systems used in this study were: potassium persulfate in an atmosphere of air, potassium persulfate in an atmosphere of nitrogen, potassium persulfate with an equal mo'ar quantity of sodium bisulfate in an atmosphere of air, and potassium persulphate with an equal molar quantity of sodium bisulfite in an atmosphere of nitrogen. All polymerizations were carried out at 40° C. and stirred continuously during polymerization.

Potassium persulfate in air gives 90% polymerization in 30 hours and a molecular weight of approximately 35,000 by viscosity measurements. Potassium persulfate in nitrogen gives 95% polymerization in six hours and a molecular weight of approximately 300 000. Potassium persulfate-sodium bisulfite in air gives 95% polymerization in eight hours and a molecular weight of approximately 40,000. Potassium persulphate-sodium bisulfite in nitrogen gives 95% polymerization in seven hours and a molecular weight of approximately 40,000.

Molecular weight determinations and precipitability measurements on samples withdrawn at various intervals during polymerization indicate that in the preparation of high molecular weight polymer, as with persulfate and nitrogen, the greatest average molecular weight occurs between 50 and 60% polymerization.

Some curves on molecular weight distribution, as determined from precipitability measurements, are also included.

September 11—Morning Session
H. M. Spurlin, Presiding

Temperature Dependence of the Adhesion of High Polymers to Cellulose. Charles H. Hofrichter and A. Douglas McLaren, du Pont.

Kinetics of the Hydrolysis of Cellulose. J. F. Saeman, E. E. Harris, and A. A. Kline, U. S. Department of Agricu'ture, Madison, Wis.

Creep of Textile Viscose Rayon. M. T. O'Shaughnessy Polytechnic Institute of Brooklyn, N. Y. (Work done at Pioneering Research Section, rayon department, du Pont, Buffalo, N. Y.)

Sorption of Water Vapor by High Polymers. Sherman E. Smith, University of New Mexico, Albuquerque, N. Mex.

Diffusion of Vapors in Films. P. E. Rouse, Jr., du Pont, Wilmington, Del.

Permeation through and Sorption of Water Vapor by High Polymers. P. M. Hauser and A. D. McLaren, du Pont.

September 11—Afternoon Session
P. D. Bartlett, Presiding

Polythene Fine Structure. W. M. D. Bryant, du Pont.

Liquid Methypolysiloxanes. Donal F. Wilcock, General Electric Co., Schenectady, N. Y.

Pigment Dispersions. Intrinsic Viscosity and Dimensions of Col'oidal Carbon in Water. R. Buchdahl, R. Braddicks, Jr., and P. V. McKinney, Sun Chemical Corp., New York.

Solubility of Low Polymers of Styrene. Paul O. Powers, Batelle Memorial Institute, Columbus, O.

Heats of Combustion and Solution of Liquid Styrene and Solid Polystyrene and the Heat of Polymerization of Styrene. Donald E. Roberts, William W. Walton, and Ralph S. Jessup, National Bureau of Standards, Washington, D. C.

Spectrophotometric - Interferometric Particle Size Determinations in Synthetic Latices and Bearing of the Results on the Theory of Emulsion Polymerization. Wilfried Heller, Wayne University, Detroit, Mich., and Howard B. Klevens, University of Chicago. The mean mass, mean volume, and mean diameter of po'ymer particles prepared by emulsion polymerization of styrene and isoprene, and by emulsion copolymerization of styrene-isoprene and styrene-butadiene, were determined by means of the "spectrophotometric-interferometric" method introduced by the authors early in 1943. The reliability of the method was checked successfully by several parallel investigations with the ultramicroscope and with the electron microscope. Additional experiments of nonoptical character made it possible to calculate the mean number of polymer particles per unit volume of latex.

The results obtained led to the fol'owing conclusions: (1) the predominant mass of polymer is formed by a reaction of monomer adsorbed by polymer particles present at an early stage of emulsion polymerization. (2) At yields in excess of 60%, the polymer production takes place almost exclusively in the polymer particles by conversion of adsorbed monomer. (3) There are several loci for the formation of polymer particles (polymer nuclei). At soap concentrations in large excess of that necessary for micelle formation, the number of polymer particles present at a given yie'd is roughly proportional to the soap concentration which may support Harkin's hypothesis, considering soap micelles as a locus of nucleus formation. Large numbers of polymer particles are formed, however, in absence of nonmicellar soap. The latter particles cannot be accounted for completely by a conversion of emulsified monomer droplet, according to work carried out in conjunction with H. Oppenheimer. A third locus of nucleus formation, possibly the monomer-water interface, must therefore be assumed, on the basis of the optical results obtained.

Papers before Other Division

Abstracts of papers considered of special interest to our readers, given before the Divisions of the Colloid and Organic Chemistry, have been selected for reprinting in connection with this report. The papers taken from those given before the Division of Colloid Chemistry were a part of a symposium on the stability of colloidal dispersions, held on Wednesday morning, September 11.

Also of special interest is a paper read before the Division of the History of Chemistry on the afternoon of September 10, by H. A. Winkelmann, of Dryden Rubber Co., Chicago, entitled, "An Historical Survey of the Rubber Industry in Chicago." No abstract of this paper has

[1] For abstract of this paper, also given before the Rubber Division, see our Aug. issue, p. 669.
[2] See our Aug. issue, p. 668, for abstract.

been prepared, but it will be published either in *Chemical and Engineering News* or India RUBBER WORLD, depending on the decision of the editor of the A. C. S. journal on the matter. The paper is also scheduled for presentation at a meeting of the Chicago Rubber Group to be held November 1.

Division of Colloid Chemistry

Coagulation and Stabilization of Synthetic Latex. Wilfried Heller, Wayne University, and H. Oppenheimer, University of Chicago. Synthetic latex prepared by the emulsion polymerization of styrene and isoprene was coagulated with various organic salts. As the polymer particles are ordinarily negatively charged, the cations acted as counterions. Their coagulating power was found to obey the rule of Schultze and Hardy, which was tested for Na^+, Mg^{++}, Al^{+++}, Th^{++++}. The latter two cations gave rise to irregular series with a wide second zone of stability. It was thus possible to prepare latices with positively charged polymer articles and to use them for coagulation of ordinary synthetic latex. A series of measurements was carried out on the variation of c_e/c_p with polymer concentration c_p; c_e being the electrolyte concentration necessary to coagulate completely, within a fixed period of time, latex with negatively changed particles. This ratio was found to decreased generally with increasing c_p. For NaCl as the coagulant, the decrease was particularly simple and followed the linear relationship. Since soaps were the main stabilizing factor in the latices studied, the description of the stabilizing electrolyte during coagulation could be followed easily by measurements of the surface tension. By the raising of the soap concentration, the stability of latex could be enhanced considerably, both toward coagulation by counterions and coagulation by freezing. Salts with polyvalent anions found to be equally effective as protective agents.

The Stability of Elastomer Latices at Low Temperature. Low- Temperature Thickening of Neoprene Latex. H. K. Livingston, du Pont. Certain types of neoprene latex undergo a marked increase in viscosity and yield point on cooling to 0 to 10° C. The change is abrupt and resembles in some respect a phase transition (sol→gel). Although this change on cooling might be considered as evidence of instability, the latex regains its normal properties on warming. Latex can be held at 0 to 10° C. for long periods without coagulation.

The temperature of paste formation can be determined accurately by a modification of the pour point test used for lubricating oils. Shear stress-shear rate curves have been used to determine the flow characteristics of thickened latex.

Increasing the concentration of either alkali or emulsifying agent increases the temperature of paste formation. Small amounts of nonionic emulsifying agents (such as nonaethylene glycol monolaurate) lower the temperature of paste formation.

Certain analogies to the behavior of soaps are pointed out, and a thoretical explanation of the thickening process is suggested.

The Stability of Elastomer Latices at Low Temperature. Coagulation of Synthetic Rubber Latices by Freezing. H. W. Walker, du Pont. A simple technique is described for determining the coagulation of freezing characteristics of small amounts of polymer dispersions in thin films under controlled conditions. Whereas films of natural rubber latex are less than 50% coagulated after nine days at -65° C., most butadiene and chloroprene latices coagulate completely within 60 seconds at -15 to -30° C.

The instability of synthetic rubber dispersions at subzero temperatures makes operable an efficient, continuous process for isolating dry polymer by means of coagulation by freezing.

The time required for coagulation by freezing of the polychloroprene dispersion varies with the temperature of the frozen film, the nature of the stabilizing agent and polymerization regulator present, and the pH of the dispersion, but it is independent, over the range studied, of the concentration of the stabilizing agent, the concentration and age of the latex, the amount of monomer present, and the presence of a solvent such as benzene. It is considered that the structure of the polymer within the dispersed particles has little or no influence on the stability of the latices at subzero temperatures, but that the colloidal character and low-temperature behavior of the stabilizing agents are the chief factors which determine the redispersibility of the polymer particles on thawing of frozen films of latex.

Flocculation of Lyophobic Dispersions by Slow Mechanical Stirring. Paul Stammberger, Stamford Rubber Supply Co., Stamford, Conn. The fact that lyophobic dispersions are flocculated or coagulated by mechanical action has been known a long time. Commercial use of this phenomenon was found in breaking crude mineral oil emulsions. Furthermore mechanical stirring is accepted as a standard method for testing stability of natural and synthetic rubber dispersions. Increased rate of slow coagulation, while stirring, has been considered by Smoluchovsky (1917), assuming that the particles can come within the sphere of attraction of one another. Coagulation on stirring should not occur if the repulsive forces between the dispersed particles are high, and the phenomenon is closely related to concepts on the stability of colloids. A few commercial and model dispersions have been studied, and it has been found that, although they remain unchanged for several months if undisturbed, coagulation or flocculation can take place in a short time on slow-speed stirring. Discussion of the cause of this behavior is invited.

Division of Organic Chemistry

Chain Transfer in the Polymerization of Styrene. Comparison of Some Hydrocarbon Solvents. R. A. Gregg and Frank R. Mayo, U. S. Rubber Co., Passaic. A new tool for quantitatively determining the reactivity of compounds toward free radicals is applied to a series of hydrocarbons. A steady concentration of substituted benzyl radicals is maintained in polymerizing styrene, and the reactivity of the radicals is independent of their molecular weight. The ability of these radicals to remove hydrogen atoms from various hydrocarbon solvents can be quantitatively compared through the transfer constant, the ratio of the rate constants for transfer, and polymerization reactions. The great selectivity of these benzyl radicals makes the styrene system very suitable for bringing out small differences between solvents in chain transfer. The transfer constants of styrene with the hydrocarbons have been determined at 60 and 100° C. As the number of aromatic groups on a given carbon atom increases, a hydrogen atom on the same carbon is removed with increasing ease. Alkyl groups exhibit a similar, but smaller effect. A close correlation exists between the stability of the free radical which is formed and the rate constant for its formation. Attempts to apply the Arrhenius equation to the correlation of structure and reactivity show that, although the activation energies for chain transfer are in the expected order, the frequency factors vary over such a wide range that the quantitative prediction of transfer constants is not possible.

[Of particular note was the paper by R. F. Dunbrook, which reviewed the government research program on synthetic rubber from the viewpoint of the organic chemist. This abstract was specially prepared for India RUBBER WORLD by Dr. Dunbrook, former head of the Copolymer Research Branch of Office of Rubber Reserve. EDITOR.]

Some Contributions of Organic Chemistry to the War Effort—Synthetic Rubber. R. F. Dunbrook, Firestone Tire & Rubber Co., Akron. During World War II the U. S. Government sponsored an extensive research program on synthetic rubber. In the Summer of 1942 the President appointed a Rubber Survey Committee to study the rubber problem. The Report of this Committee recommended that inventors and research groups be encouraged to do work in the synthetic rubber field, and the Executive Order of September 17, 1942, provided for appointment of a Rubber Director. Included among his duties was full responsibility for technical research and development with respect to the nation's rubber program in all its phases. At the request of the Rubber Director, Rubber Reserve Co. entered into contracts with a number of universities and research institutions covering research on synthetic rubber. The following universities and laboratories participated in the program on polymerization research.

Universities: Case School of Applied Science; Cornell and Johns Hopkins universities; Massachusetts Institute of Technology; New York, Princeton and Stanford universities; universities of Akron, Chicago, Cincinnati, Illinois, Louisville, Minnesota, and Notre Dame.

Industrial and Research Institutions: Bell Telephone Laboratories, Bureau of Standards, Firestone Tire & Rubber Co., Goodyear Tire and Rubber Co., Hycar Chemical Co., Standard Oil of New Jersey, The B. F. Goodrich Co., and United States Rubber Co.

The research program on synthetic rubber was conducted under the Copolymer Research Branch as part of the Research and Development section of the Office of the Rubber Director, War Production Board. After the resignation of the Rubber Director on September 1, 1944, the Copolymer Research Branch (then known as Polymer Research Branch) was transferred to the Research and Development Division of Rubber Reserve Co.

A copolymer of butadiene and styrene known as GR-S, signifying Government Rubber-Styrene type, had been selected as the general purpose synthetic rubber. The purity of the raw materials used in the GR-S polymerization recipe was of great importance to the proper operation of the synthetic rubber plants and the quality of the polymer produced. The effects of small amounts of impurities in the butadiene, styrene, and soap on the

rate of polymerization and the quality of the rubber were investigated. Vinyl acetylene, vinyl cyclohexene, and 1,4-pentadiene showed the most pronounced effect on the rate of polymerization or quality of the polymer. Polyunsurated acids in the soaps were also found to have a marked effect on the rate of polymerization. In general the nature of the impurity was of greater importance than the amount present.

The modifier is an essential ingredient in the GR-S recipe since the processability and the quality of the rubber are dependent upon the amount and the type of modifier used. A large number of modifiers was synthesized and evaluated in the GR-S recipe. Primary dodecyl mercaptan (designated as DDM) was found to function most satisfactorily. Lorol alcohol from cocoanut oil is used as the commercial source for the preparation of DDM. The function of the modifier, its rate of disappearance during polymerization, and factors affecting the rate of disappearance were studied. A new class of compounds, the diazothio ethers, which function both as catalyst and modifier was developed in the program.

Commercial rosin soaps proved unsatisfactory as emulsifiers in the GR-S recipe because of strong inhibitory effects. Resin acids of the abietic and levopimaric acid type and certain phenolic inhibiters were found responsible for the inhibiting effect. Hydrogenation or dehydrogenation of abietic acid to hydroabietic acids and dehydroabietic acid and removal of the phenolic inhibiters gave a satisfactory emulsifier. A purified dehydrogenated rosin soap (Dresinate 731) is being produced commercially and is used in the manufacture of GR-S-10.

A shortstopping agent must be added to the latex after polymerization is carried to the desired conversion. The function of the shortstopping agent is to destroy the remaining catalyst and other peroxides and thus prevent further polymerization during the stripping operation. A large number of organic compounds was tested. Hydroquinone and Tuads were found to be very effective and are used today.

Analytical methods for the determination of styrene and polystyrene in GR-S were developed. It was shown that GR-S is a true copolymer of butadiene and styrene containing an average styrene content of approximately 21% when the charging ratio of butadiene to styrene is 75/25. Calculation of the styrene content of polymer increments formed at different conversions shows that GR-S is very heterogeneous, the first polymer formed having a styrene content of 17% and increasing to 29% at 78% conversion.

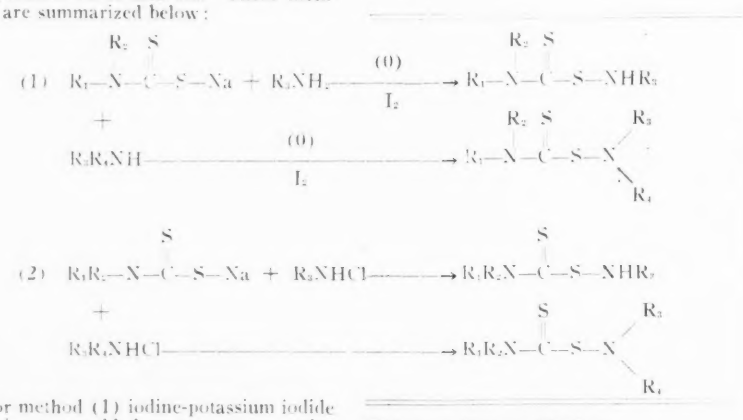
The ozonolysis and the perbenzoic acid methods were used to determine the amount of 1,4-addition of butadiene in GR-S. The 1,4-addition in GR-S is approximately 78% and is not altered by changes in the butadiene-styrene ratio, temperature of polymerization, type of modifier and conversion. Sodium polymers show a much higher 1,2-addition than emulsion polymers.

A large number of styrene derivatives was prepared, and copolymers of these with butadiene were evaluated for physical properties. The mono- and dichlorostyrenes were available in larger quantities, and truck tires made from the butadiene-chlorostyrene copolymers showed from 15-20% improvement in wear over GR-S. Copolymers of butadiene with vinyl pyridine showed improved physical properties, but were not compatible with GR-S or natural rubber.

The term "popcorn polymer" in the GR-S plants is associated with the solid material insoluble in styrene or benzene which forms in the recovery system of the plants such as the booster condensers, pipe lines, flash tanks, styrene decanters, etc. The material is fairly dense, if formed in a confined space; otherwise it is of very low density. Factors responsible for its formation were investigated, and a hypothesis to account for the formation was proposed. Methods for eliminating the formation of the troublesome "popcorn polymer" are being tested.

Although emulsion polymerization was used for the manufacture of GR-S, considerable research was conducted on methods of polymerization using sodium. Sodium sand, sodium hydride and complexes that contain organo sodium compounds were used as catalysts, and the reactions were carried out both in the liquid and the vapor phase. A number of modifiers for the reaction were found.

Thiocarbamyl Sulfenamides. George E. P. Smith, Jr., E. L. Carr, K. C. Young, and Glen Alliger, Firestone Tire & Rubber Co., Akron. Experimental work on the preparation of the N,N-dialkylthiocarbamyl sulfenamides, $R_1R_2NCSSNH_2$ (I), and the corresponding alkyl substituted compounds, $R_1R_2NCSSNHR_3$ (II), and $R_1R_2NCSSNR_3R_4$ (III), was undertaken as an extension of earlier work on thiazyl sulfenamides.[3] For the preparation of (I) simultaneous addition of a sodium N,N-dialkyldithiocarbamate and sodium hypochlorite to concentrated ammonia was used. Two methods used for the thiazyl sulfenamides were found suitable for the preparation of II and III. These methods are summarized below:



For method (1) iodine-potassium iodide solution was added to an aqueous solution of the dithiocarbamate and the amine, generally at a temperature of 25 to 50° C. When method (2) was used the N-monochloroamine was prepared by addition of sodium hypochlorite solution to the amine at about 0° C. At this same temperature, and generally without isolating the chloramine, the thiocarbamate solution was then added to the reaction mixture. If sodium hypochlorite was employed instead of iodine in method (1), the product contained, in addition to the expected sulfenamide, some tetraalkylthiuram disulfide, $(R_1R_2NCSS)_2$ (IV).

Although the thiazyl sulfenamides yield thiazyl disulfides on decomposition, the thiocarbamyl compounds decompose to form sulfur and symmetrical dialkylureas instead of thiuram disulfides, (IV).

[3] Unpublished communication from this laboratory, presented at the A. C. S. meeting, Atlantic City, N. J., Apr., 1946.

Power Show Demand Reflects Active Market

CONTINUED reorganization and expansion of industries everywhere will sustain a heavy demand for power equipment during many months to come. First reports from the list of almost 400 exhibitors booked for the Seventeenth National Exposition of Power and Mechanical Engineering reveal a firm market for their products now, with an increase in prospect when they can show their new lines. Some of these will be announced during the fall, but many will be unveiled at the exposition to be held at Grand Central Palace, New York, N. Y., on December 2 to 7.

Lists of exhibits already compiled constitute an extensive catalog covering all kinds of industries from the standpoint of their power needs, and also such processing services as fuel, heat, steam, air and water supplies, materials handling and others. New designs will be featured by most of the exhibitors, with emphasis on the use of specially selected materials including a number of new special alloys. Makers of many items, such as valves, will offer interchangeable parts of various metals in otherwise standard units, affording selectivity according to the type of fluid to be handled and the temperature and pressure requirements.

Included in the great variety of instruments and special-purpose appliances will be many which have a wide range of application, as is the case with air-hydraulic presses, high-pressure pumps, and others. Such variations help to make the exposition one of the most comprehensive ever held.

Chicago Group Outing

THE Chicago Rubber Group held its annual summer golf outing on July 20 at the Acacia Country Club, with 130 members and guests attending. A feature of the awarding of prizes was the announcement that the United Carbon Co. was donating a trophy to be awarded annually to the golfer having low gross score at the group's outing. The award, to be known as the United Carbon Co. trophy, will be permanently retained by the contestant winner for three consecutive years. This year's winner was L. B. Wagner, Metro Rubber Products.

In addition an unusually large number of golfing and door prizes were distributed through the courtesy of 51 companies and suppliers. The committee for the outing consisted of Charles E. Wonder, Charles M. Baldwin, William N. Crumpler, and D. M. Pratt.

Alien Patents Available for Licensing

THE following is a list of United States patents seized from nationals of enemy countries on rubber thread, rubber tires, and chlorinated rubber. Preliminary investigation indicates that the patents listed are available for license. The Alien Property Custodian's licenses on vested enemy patents are non-exclusive and royalty free for the remaining life of the patents; the only cost is an administrative fee of $15 a patent. License applications, accompanied by remittance for the fee, should be sent to the Office of Alien Property Custodian, Washington 25, D. C. Instructions for making application for license are given in an "Index and Guide" to the vested patents, copies of which may be obtained from any Alien Property Custodian office. Similar lists covering rubber toys, vibration dampers, coating materials, hose and belting, cushions, cable-insulation, cable sockets, cements, and miscellaneous products will be published in an early issue.

Patent. No.	Class & Sub-Class	Date of Issue*	Inventor	Residence	Title of Invention
			RUBBER THREAD		
APC292,154	91	5-4-43	Fritz Drechsel	Germany	Treatment of Yarns.
1,717,248	18-58	6-11-29	Ugo Pestalozza†	Italy	Manufacture of Rubber Articles.
1,963,226	96-26	6-19-34	Claus Cosman	Germany	Rubber Cord.
2,052,361	18-54	8-25-36	Ugo Pestalozza†	Italy	Manufacture of Elastic Rubber Thread, Cord, Strip and the Like.
2,095,529	28-75	10-12-37	Carl Theodor Pastor	Germany	Process to Make Rubber Thread and Rubber Thread Textiles.
2,127,070	18-54	8-16-38	Ugo Pestalozza†	Italy	Manufacture of Rubber Thread.
2,149,425	18-54	3-7-39	Max Draeman	Germany	Rubber Thread and Method of Making Same.
2,178,955	18-8	11-7-39	Max Draeman	Germany	Production of Rubber Filaments.
2,199,882	18-54	5-7-40	Toyohachiro Inokuchi‡	Japan	Process and Apparatus for Spinning Rubber Thread from Rubber Latex
2,253,067	18-54	8-19-41	Max Draeman	Germany	Production of Rubber Thread.
2,280,833	164-38	4-28-42	John Bach	Hungary	Production of Rubber Thread.
			RUBBER TIRES		
APC187,220	154	12-15-37	Paul Esselman, *et al*	Germany	Rubber Fabrics for Tires Conveyer.
APC281,735	154	6-15-43	Otto Giese	Germany	Method of Firmly Uniting Rubber with Inserts or Applied Layers of Fibrous Material.
APC337,600	18	4-27-43	Carl Hubener	Germany	Vulcanizing Mold for Vehicle Tire Made of Rubber.
1,815,507	152-325	7-21-31	Ludwig Harter	Germany	Rubber Tire.
1,983,238	152-176	12-4-34	Max Mycklick	Germany	Anti-Skid Tire for Motor Vehicles.
2,004,036	152-209	6-4-35	Ernst Coenning	Germany	Anti-Skidding Tire.
2,006,038	152-211	2-25-35	Masuji Yamaki	Japan	Vehicle Tire.
2,007,724	152-284	7-9-35	Stefano Paller	Italy	Tubular Rubber Tire with Metal Springs.
2,045,214	152-177	6-23-36	Ernst Coenning	Germany	Anti-Skid Device.
2,065,971	154-10	12-29-36	Leonard Herbert	Germany	Manufacture of Pneumatic Tire.
2,104,532	152-209	1-4-38	Robert Summer¶	Germany	Non-Skid Tire.
2,135,940	106-33	11-8-38	Hanns Heil§	Germany	Air Tube Packing.
2,127,075	152-342	8-16-38	Giuseppe Venosta†	Italy	Composite Pneumatic Tire.
2,294,826	154-40	3-21-38	Wilhelm Bergenthum and Ernst Pieper	Germany	Method of Treating Textile Material.
2,337,464	154-43	12-21-43	Otto Hecht and Hans Prillwitz	Germany	Preparation of Composite Rubber Articles.
2,166,511	152-157	7-18-39	Emil Witzinman	Germany	Pneumatic Tire.
			CHLORINATED RUBBER (Including Uses)		
1,987,171	260-770	1-8-35	Erwin Walz‖	Germany	Production of Conversion Products of Caoutchouc.
2,054,389	117-75	10-3-33	Lec Rosenthal‖	Germany	Protecting of Light Metals.
2,142,193	260-735	1-3-39	Franzjakob Janz	Germany	Cold Sealing Mass.
2,164,140	260-771	6-27-39	Tengo Mochizuki§	Japan	Method of Converting Natural Rubber or the Like Quickly into Rubber Hydrochloride.
2,156,455	28-79	5-2-39	Johannes Kleine‖	Germany	Manufacture of Felt.
2,206,883	260-613	7-9-40	Kurt Deesmari‖	Germany	Aromatic-Aliphatic Acetals.
2,344,018	260-4	3-14-44	Erich Baumheirer	Germany	Submarine Paint.

*Dates of patent applications are filing dates.
†Assigned to Societa Italiana Pirelli.
‡Assigned to Toyo Gamu K. K. Kaisho.
¶Assigned ½ to Walter S. Blustein N. Yard, ¼ to Bruno Cossalter Feltre.
§Assigned ½ to Masataro Konishi.
‖Assigned to I. G. Fabenindustrie, A.G.

Rubber Processing Panel

THE first fall meeting of the New York Rubber Group is being held October 18 at the Hotel McAlpin, New York, N. Y. "Processing of Natural and Synthetic Rubber" will be the topic under discussion, with a panel of experts to answer questions. There will be short paper given on mixing, calendering, and extrusion, respectively, following which the panel will answer questions submitted in advance by members of the New York Group.

Synthetic Rubber Price Changes

THE price of GR-S Black One and GR-S Black One AC has been reduced to 14.67¢ a pound, and the price of GR-S Black Plant Clean-up reduced to 13.2¢ a pound (plus the applicable uniform freight charge), effective September 1. These price changes were given in a memorandum to the rubber industry from the Office of Rubber Reserve, dated August 29, which stated that the new prices reflect a reported lower cost of blending the carbon black with the GR-S, and the recent price increase of carbon black.

Reports of Rubber Consumed Not Required

A MEMORANDUM to the rubber industry from the Office of Rubber Reserve, dated August 29, states that, effective immediately, purchasers of natural and synthetic rubbers are no longer required to furnish reports of rubber consumed in government orders. Such reports were formerly specified by Section 12.00 of the General Sales and Distribution Circular. In the event that purchasers have partially completed reports, it will be unnecessary to complete such reports or to forward any information on these reports to the Office of Rubber Reserve.

New Navy Specifications

THREE new specification titles appearing since our previous listing in the September issue are given below, in accordance with INDIA RUBBER WORLD'S policy to keep the rubber industry currently advised of changes in or additions to pertinent Navy Department Specifications and Bureau of Ships' Ad Interim Specifications. Those members of the industry desiring copies of these specifications can obtain them upon request, giving title, number, and date, from the United States Navy Department, Bureau of Supplies and Accounts, Washington 25, D. C.

The new specifications are given as follows:

Navy Dept. Spec. 52P60a — Protective-Coating-Material, Polymer-Powder (Product of an Organic Dihalide and an Inorganic Polysulfide), dated 1 July 1946.

Navy Dept. Spec. 33R1h — Rubber, Synthetic; Gaskets, Packing, Sheets, and Strips, dated 15 July 1946.

Navy Dept. Spec. 33B5a—Bearing-Strips, Synthetic Rubber (Water Lubrication), dated 1 August 1946.

Plastics Technology

Flexible Organic Adhesives as Structural Elements[1]

D. L. Loughborough[2] and F. D. Snyder[2]

RECENTLY many organic adhesives have been placed on the market which are capable of forming sufficiently strong bonds to be used in structural parts. The interest arose primarily as a result of special needs of the aviation industry for war production. At least seven different materials have been offered,[3] each one has advantages, either in method of application or in properties of the "cured" bond. (A "cured" bond usually refers to the joint made by an adhesive which has undergone a reaction, caused by some means such as heat, pressure, or a chemical catalyst.) The evaluation can only be made by actual service; the laboratory data should be used as a guide.

It is proposed to submit the available data on one of these structural adhesives, Plastilock 500. This bonding material is an alcohol solution of synthetic organic resins. The "cured" bond is unaffected by temperatures from —60 to +160° F., but weakens at temperatures above +160° F.

The variety of methods for joining aluminum alloy products has recently been described by Hartman, Hoglund, and Miller.[4] They discuss riveting, welding, brazing, soldering, and resin bonding. Each of these methods has special advantages and disadvantages which must be considered by the designer. A cemented joint has the following properties:

ADVANTAGES

1. A smooth, clean, continuous joint is obtained.
2. There are no local stress concentrations to encourage buckling.
3. The method is applicable to materials such as wood, paper, plastics, etc., which cannot be fastened by other methods.
4. Easy production methods are possible.
5. Air and liquid tight points are obtained.

DISADVANTAGES

1. Production tooling is different from methods now in common use.
2. No method is known for determining the perfection of a finished joint. Process control is required.
3. With very thin, flexible materials, such as aluminum foil, the bonded materials can be easily bent. Applying a load to such a joint results in the stress being concentrated along one line in the cement, and hence failure at low applied loads. This property, known as strip resistance, is generally poor in cemented joints.

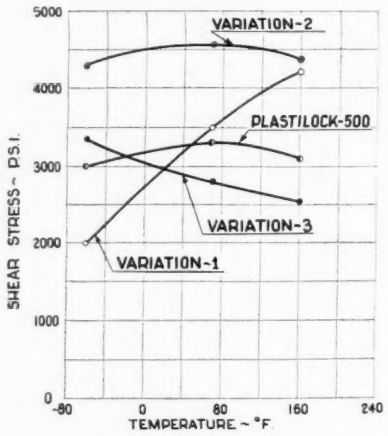


Fig. 1. Changes in Shear Strength with Temperature at Plastilock-500 and Three Modifications

The strength of a joint may be given by its efficiency. This efficiency is the ratio between the stress in the metal outside the bond when the joint fails and the ultimate stress of the metal. The maximum strength of any type of joint will depend on such factors as the overlap of the joint and the thickness of the materials being joined. From references [5,6] it is possible to make an estimate of the relative efficiencies of various joining techniques. The overlap given in the third column of Table 1 is the lowest which can be used to obtain the results listed in the second column.

TABLE 1. COMPARISON OF JOINING TECHNIQUES

Method of Joining	Maximum Possible Efficiency—%	Minimum Overlap—In.
Riveting	80	1½
Spotwelding	87-93	1½
Cementing	90	¾

These efficiences apply only to single, simple joints in tension. In complicated structures the joint strength will be lower because of stress concentrations at the joint. For instance, a sheet-stringer combination under end load wrinkles at low loads because of the stresses at rivet heads. In such a service continuous joints have proved advantageous.

Physical Properties of Plastilock 500 Joints

The measured properties depend on the temperature of the cure, the temperature of the test, the metal thickness, the extent of the overlap, the shape of the metal at the joint, the thickness of the bonding medium, and the fit of the pieces to be joined. The effect of these factors will be examined in detail later. In Table 2 are presented some typical data on joints made with 24ST Alclad with ½-inch overlap. These tests were made on 0.032-inch thick metal, with a bonded area ½- by ½-inch. The samples were pulled at one inch per minute.

The immersion tests were run by placing the joined test pieces in the solvent mentioned and making shear strength determinations weekly. The tests were discontinued at the end of 60 days. The joined area was chosen to be ½- by ½-inch to give a large exposed edge length compared to joined surface.

Table 2 shows at once that the material is slightly heat sensitive. By adjustment of the ingredients it is possible to change this sensitivity. Figure 1 shows the changes in shear strength with temperature for Plastilock 500 and three variations not as yet commercially available, in a joint with ½-inch overlap, on 0.064-inch as received 24ST Alclad.

The tensile strength of the cement is high, giving 8,800 psi. on steel and more than 8,000 psi. on 24ST. When pulled in tension, stress concentrations are at a minimum and the joint exhibits its full strength.

The absolute value of the strength, in tension or shear, depends on joint geometry. The transfer of load from one section of metal to the other causes a moment, imposing both shear and tension on the bond[5,7]. The strength will not increase in direct proportion to the joint overlap. In addition the elongation of the metal, as the load is applied, causes a stress concentration in the cement.[8] This second situation can be relieved by the use of a beveled joint. By keeping the combined thickness of metal constant across the overlap DeBryne[8] has shown that the joint strength can be made to increase in strength in direct proportion to the overlap. Table 3 gives similar data on Plastilock 500.

TABLE 2. PHYSICAL PROPERTIES OF PLASTILOCK 500

	A. Strength		
	—60° F.	+70° F.	+160° F.
Shear strength	3000 psi.	3300 psi.	3100 psi.
Tensile strength	....	8000 psi.	....
Impact strength	13 ft. lbs./in²	13 ft. lbs./in²	....
Stripping load	Low	Low	Low
Fatigue (max. stress 1000 psi.)	..	>108 cycles	

B. Stability in the Presence of Solvents

Effect of immersion in water	Metal and plastic bonds—no loss in 60 days Wood bonds—see discussion Glass bonds—destroyed in a few hours
Effect of salt water spray	No effect on shear strength after 60 days on 24ST alloy
Effect of immersion in	
100 octane gasoline	No loss in strength after 60 days on metals
40% aromatic gasoline	10% loss in strength after 60 days on metals
Alcohol and ketones	Bond destroyed by this type of solvent

[1] Presented before the Rubber and Plastics Division, A.S.M.E., Detroit, Mich., June 20, 1946.
[2] B. F. Goodrich Co., Akron, O.
[3] Cycleweld, Redux, Plastilock 500, Reanite, T-46, Metlbond, Phobond.
[4] *Trans. Am. Soc. Mech. Engrs.*, 67, 1 (1945). (*Welding J.*) Oct., 1943, pp. 528-32.
[5] E. S. Jenkins, *SAE Journal* 52, 421 (1944).
[6] C. H. Holliman, *J. Aeronaut. Sci.*, 10, 295 (1943).
C. W. Stewart, Welding Research Supplement.
[7] M. Geland and Reissner, *J. Applied Mechanics*, 11, A17 (1944).
[8] N. A. DeBryne, *Iron Age*, 154, 8, 60, (1944).

TABLE 3. EFFECT OF JOINT GEOMETRY

Overlap—Inch	Metal Thickness—Inch	Shear Strength (Psi.) Plain Overlap	Beveled Overlap
¼	0.064	4100	
½	0.064	3300	
1½	0.064	2450	
1½	0.125		4800

In the joint with beveled overlap, two 0.125-inch thick by one inch wide pieces of alloy were milled so that the thickness varied from nearly zero at the end to the full ⅛-inch at a point 1½ inches from the end. These pieces were then cemented together, with the adhesive on the straight surfaces. When tested, the the elongation in the two metal sections was nearly equal, decreasing the stress concentrations and giving much higher strength. The stripping load is not given in Table 2 because no satisfactory test is known for this type of joint. It is, however, valuable to keep in mind that this and most other organic adhesives are poor in this regard and should be protected by terminal rivets or similar type of fastening at the end of joints to prevent tears from starting.

Tests of the fatigue resistance of Plastilock 500 joints were conducted on the R. R. Moore fatigue machine, using a rotating beam specimen in which the stress is reversed completely each cycle. With a maximum stress of 1,000 psi., samples have not failed in 10^8 cycles. At higher stresses our results are incomplete. Statically a bond will hold 2,000 psi. indefinitely. Again, the life at higher load has not been determined in this laboratory.

Table 2 gives the results on the solvent resistance in sufficient detail to need no further comment. The tests in salt water were interesting. On the ½- by ½-inch sample using 24ST Alclad the bond area was reduced by 50% owing to metal corrosion between the alloy and Alclad coating. On a similar sample from which the Alclad had been removed there was no measurable loss in strength at the end of 60 days. Evidently the Plastilock 500 is a good protective coat for aluminum alloy.

Bonds to Other Than Aluminum

One of the principal advantages of an organic adhesive is that it can form good bonds to materials such as wood, plastic, rubber, etc. The strength of the bond depends on the nature of the solid being bonded. Table 4 gives the measured shear strength for a number of different materials, in order of decreasing strength.

TABLE 4.
SHEAR STRENGTH OF PLASTILOCK 500 BONDS DIFFERENT BONDED MATERIALS

Solids	Shear Strength (Rm. Temp.) PSI.
Spring steel	4,800
Magnesium alloy AMC 525-H (sodium dichromate treated)	3,500
24ST Alclad	3,300
24ST alloy	3,300
Tungsten	3,100
Structural steel	3,000
Chromium plated steel	3,000
Silver	2,800
Stainless steel	1,700
Anodized aluminum	1,500
Everdur (over 95% copper)	1,000
Brass	875
Zinc	600
Magnesium Alloy AMC 525-H (untreated)	600
Soft wood	Bonded material failed in tension or shear. Therefore the bond was stronger than the test material, which was 0.032-inch or greater in thickness.
Monel metal	
Tantalum	
Tin	
Lead	
Phenolic resin	
Urea formaldehyde resin	
Formica	
Fiberboard	

The high value for spring steel is notable. It is also of value to note that the treated magnesium can be joined by a strong bond; while the untreated material is adhered to poorly. The low adhesion to zinc, brass, and copper alloys should be observed.

The evaluation of Plastilock 500 as a wood adhesive followed Army and Navy specification AN-NN-P-511b and AN-G-8. When tested dry, there was 100% wood failure at 570 pounds. After 48 hours in cold water, tested wet, the failure was in the wood at 464 pounds; after three hours in boiling water the strength had fallen to 244 pounds, an adhesive failure. On drying, the bond strength again reaches its high dry value. Thus the bond formed is extremely good, but the resistance to water is poorer than some of the best wood glues available. The temperature required is too high and the time required to form a joint too long to make Plastilock 500 a good commercial plywood glue, but it will find many uses for forming special types of bonds involving wood.

Methods of Application of Plastilock 500

To secure such high physical strength from organic adhesives some care must be taken in forming the bond.

Cleanliness of Metal

Bonds are strongest to smooth, unscarred surfaces. Experience has shown that a buffed or blasted surface is of no advantage and should be avoided. Any good chemical cleaning and degreasing process is satisfactory. No particular care is required to protect the cement from dust or other fine dirt, though particles with a diameter comparable to the bond thickness must be avoided in the cement.

Applying Plastilock 500

This adhesive is most satisfactory applied by brushing, although dipping and spraying techniques have been used. In brushing, the cement should be allowed to flow on, without attempt to brush out the cement. Two coats should be used on each surface to be joined, allowing each coat to dry at least one hour at room temperature; this time can be reduced by the use of higher temperatures. After this drying, the film should be fairly hard, only slightly tacky. Longer drying times are not injurious. The presence of small bubbles in the cement after drying is normal; these disappear later.

Preheating

TABLE 5. EFFECT OF PREHEAT AND CURING TEMPERATURE AND TIME ON BOND STRENGTH

Preheat Time	Curing Time	Preheat and Curing Temp. °F.	Shear Strength (Psi.) Rm. Temp. 24ST Alclad
30	45	250	1620
25	30	280	1920
20	25	300	2175
13	18	325	2360
10	12	350	3300

In order to remove completely all solvent, and to start curing, it is desirable to heat the cement at an elevated temperature. This heating may be done either with the parts assembled, but no pressure applied, or with the parts separated entirely. The time and the temperature suggested for this operation are given in Table 5.

Curing Time and Temperature

Following the preheat, the joint is formed under heat and pressure. By using the correct amount of accelerator a bond can be formed at most temperatures in any predetermined time. Considerations of shelf life, ease of handling the cement, etc. usually dictate the commercial considerations. With a fixed amount of accelerator a bond can be formed at any temperature provided enough time is allowed for bond formation. As a general statement, the bonds which are cured at high temperature for short times give better adhesions. For a fixed formulation the strength decreases as the temperature of cure decreases. Recommended time and temperatures, together with resulting strenths, are given in Table 5.

Pressure

The bond can only be formed when the two metal surfaces are brought into reasonably close contact. McBain and coworkers[9] have studied the adhesive properties of pure chemicals and have shown that in specific adhesion the strength of the bond rises rapidly with decreasing film thickness when the surfaces fit. A good bonding job can be expected if the two surfaces to be joined are good mates. Under such conditions only light bonding pressures are required. The effect of pressure on the bond strength of two, as received sheets of 24ST Alcad, is given in Table. 6.

TABLE 6.
EFFECT OF CURING PRESSURE ON BOND STRENGTH

24ST Alclad Sheet Curing Pressure PSI.	Rm. Temp. Shear Strength PSI.
5	1610
10	1710
25	2835
50	3180
100	3300

At extremely low pressures the bond formed will not be continuous, resulting in low strength. At pressures of from 50 to 100 psi. the bond becomes complete, resulting in maximum strength. With these pressures the cement layer will be found to have a thickness of about 0.005-inch. Further increase in pressure during cure squeezes out the cement excessively, decreasing the film thickness. Since the cement must stand considerable strain because of metal elongation,[8] this decrease is not desirable.

Extremely close control of film thickness is not necessary with Plastilock 500.

Theory of Adhesion

TABLE 7.
EFFECT OF ATOMIC SPACING ON ADHESION

Metal	Max. Atomic Spacing Å
Spring steel	4.04
Magnesium alloy (sodium dichromate treated)	3.20 or 5.20
Aluminum Alloy 24ST	4.04
Tungsten	4.47
Chromium	4.06
Structural steel	4.04
Silver	4.07
Stainless steel	3.63
Everdur	3.61
Brass	3.61
Zinc	2.66

It is agreed amongst those who have

[9] J. W. McBain and D. G. Hopkins, *J. Phys. Chem.*, 29, 188 (1925), 30, 114, (1926); United Kingdom Dept. Sci. & Ind. Research, "Second Report of Adhesives Research Commission 1926," pp. 34-89.
J. W. McBain and W. B. Lee, *Proc. Roy Soc. (London)*, 113A, 606 (1927); *Ind. Eng. Chem.*, 19, 1005 (1927); *J. Soc. Chem. Ind.*, 46, 321T (1927); *J. Phys. Chem.*, 31, 1674 (1927), 32, 1178 (1928).

studied the field of metal to metal cementing that the bond is of a specific nature involving either primary or secondary valence forces. However several interesting features have been observed. Table 7 gives the relation between the adhesion and the spacing of the atoms in metallic crystals. These metals are arranged in the approximate order of decreasing adhesion to Plastilock 500.

The maximum atomic spacing is the largest distance between the atoms in the crystal. In the face centered cubic structure, this spacing is equal to the lattice constant of the crystal. In the body centered cubic, the spacing is $\sqrt{2}$ times the lattice constant. In the close packed hexagonal structure, the spacing may be either of the lattice constants. It will be observed that metals with spacing over 4 Å give good adhesion; while these under 4 Å are poor. The measured identity period of the adhesive is 4.53 Å.

The adhesion obtained also depends on the type of oxide present. For example, anodized aluminum gives very poor adhesion, which may be due either to a change in the crystal structure or to the type of oxide surface. This problem becomes very complex because of the large number of different oxides which may exist on the same metal.

Summary and Conclusions

The cement described forms a strong, thermally stable, chemically resistant bond between many different materials. Since experience has shown that the properties can be varied over wide ranges, the comments of users of the material will be helpful in future formulations.

Plastilock 500 is a new organic adhesive suitable for use on metals, plastics, and other rigid materials. Shear strengths of 3,300 psi. and tensile strengths of 8,000 psi. have been obtained on aluminum alloys tested at room temperature. This shear strength is 3,000 psi. at — 60° F. and 3,100 psi. at + 160° F. Shear strengths on other materials range from 4,800 psi. on spring steel to 600 psi. on zinc and untreated magnesium alloy.

Gasoline has little effect on this adhesive. Water and salt sprays have little effect on metal or plastic bonds, but destroy glass bonds in a very few hours. The bonds will not resist alcohols and ketones.

Application includes drying and heating under pressure. Good results can be obtained by curing 12 minutes at 350° F., and somewhat inferior results by curing 45 minutes at 250° F. Pressures of 25 to 100 psi. during curing give the best results.

There is some indication that the adhesion is best when the atomic spacing in the joined pieces is similar to that of the adhesive. Best results are obtained with metal crystal spacings of more than 4 Å.

It is quite clear that the theory of adhesion is poorly understood and should furnish excellent material for fundamental research work of the highest type.

New GE Laminating Plant

INITIAL production in a $5,000,000 factory, designed to be the largest and most modern plastics laminating plant in the country, was started August 1 by the General Electric Co. plastics division. Although construction was by no means complete on that date, and only a few of the more than 100 presses had been installed, the first sheets of laminated material emerged from the line. The new plant at Coshocton, O., is replacing present GE facilities for the manufacture of laminants at Lynn, Mass. The plant will consist of three buildings, with the principal factory building comprising 235,820 square feet, and is expected to have an ultimate capacity of twice the present company output. Provisions have been made for the manufacture of both high- and low-pressure laminating materials, their fabrication, and the production of Fabroil gears. The largest press in the new plant will be a 5,000-ton affair, capable of producing laminated sheets 50 by 100 inches. Another giant press will form sheets 30 by 110 inches; while other presses will range from 10 to 1,800 tons.

Vinyls Market Expansion Foreseen

DESPITE a tenfold increase since 1940 in production and use of vinyl resins, there are still potential markets in coated fabrics and paper, film and sheeting capable of absorbing more than ten times the volume of such resins currently being produced for those uses, James J. Newman, vice president of The B. F. Goodrich Co., Akron, O., told a group of manufacturers and processors at the "Koroseal Forum," held on September 10 at the Waldorf-Astoria Hotel, New York, N. Y. The forum was sponsored by Comprehensive Fabrics, Inc., distributer of Koroseal in the consumer goods field, and by Goodrich, with about 100 Koroseal licensees and prospective licensees attending the morning and afternoon sessions, and 250 persons at the dinner meeting.

Mr. Newman emphasized that this estimate was based on a "reasonable and conservative" replacement of present materials with vinyl resins, plus creation of new and superior articles.

"The plastics business is by no means a side-issue with our company," he said, "but an important and ever-growing division to which we are giving and will continue to give the full range of company support in terms of finance, technical research, merchandising, advertising and sales promotion."

After showing that the national dollar-volume consumption of all types of plastics would reach $750 million this year, the Goodrich executive disclosed that the production of vinyl resins in April, 1946 had reached an annual rate of 119,600,000 pounds, almost ten times the 12,000,000 pounds produced in 1940. Goodrich's business research department had surveyed potential markets for Koroseal, Mr. Newman explained, and in the section of its report dealing with products from coated fabrics and papers, films and sheeting, the indicated potential market, in terms of resin content, was 400,000,000 pounds; whereas the present actual use of vinyl resins in such types of merchandise was at the annual rate of 35,000,000 pounds.

Joseph P. Kasper, president of the Associated Merchandising Corp., also addressed the evening meeting on what the retailer expects from plastics. He strongly emphasized the need of manufacturers of plastics products "knowing exactly what their products will and will not do," and for putting out correct and thorough information for the guidance of both the retailer and the ultimate consumer. He decried the tendency to overuse the presumed magic word "plastic" as a means of attributing glamour or super-quality to an article and urged that promotion of such articles be on the grounds of their actual merits.

Plastics Accounting Manual

PUBLICATION of an accounting manual for the use of firms in the plastics industry has been announced by the Society of the Plastics Industry, Inc., 295 Madison Ave., New York 17, N. Y. The manual is the result of more than a year's work on the part of a committee representing the foremost concerns in the plastics field. Bound in loose-leaf form to permit addition of supplementary material as developed, the manual contains all the basic information necessary to install a sound accounting system.

Subjects covered in the manual include financial statements, classification or chart of ledger accounts, sales analyses, accounting for manufacturing costs, accounting for general expenses, formula for costs and estimates on individual articles, supplements and appendices on specific accounts, together with suggested forms and procedures. Copies of the manual are being distributed to members of the Society, and additional copies may be obtained upon application to the Society headquarters. The price to SPI members is $2.50 a copy, and $5.00 to all others.

New England Meeting

The New England Section of the SPI will hold its annual meeting at Equinox House, Manchester, Vt., on October 17 and 18. The Section consists of 76 firms engaged in manufacture and merchandising of plastics. Invitations to the entire American and Canadian membership, over 600 firms and consultants, have been issued by the Section through W. B. Wallace, Mack Molding Co., who is conference chairman.

Technical papers specially prepared for the conference will be presented in morning sessions, with afternoons held open for sports and Green Mountain tours. There will be a banquet the evening of October 18. Papers to be presented are: "Review of Plastic Materials Supply Outlook," Frank H. Carman, general manager of Plastic Materials Manufacturers Association, Inc.; "Extruding Acrylics," James Bailey, vice president and director of research, Plax Corp.; "Printing on Vinyl Film," Chester M. Robbins, vice president of Aridye Corp.; "Roll Leaf Stamping on Plastics," C. A. Lydecker, president of Peerless Roll Leaf Co., Inc.

National Plastics Exposition

Praise of Chicago industrialists for the huge expansion of plastics production there in the last three years was voiced by Neil O. Broderson, president of the SPI and of the Rochester Button Co. He cited the area as "a proving ground for the world," and predicted a gigantic attendance at the National Plastics Show to be held at the Chicago Coliseum on May 5 to 11, 1947. More than one-third of America's plastics now come from the Chicago area, meaning about $300 million worth annually, said Mr. Broderson, who estimated that there must be 100 new plastics companies there

The May show will display new plastics

from all over America as well as captured German plastic products.

"Plastics will remain conservative, going into factory fly-wheels as well as nylons," Mr. Broderson declared, "but we'll have startling innovations at the show. Everything from plastic boats to draperies for your house, and plastic wall sections for the new house."

Chicago-made plastic products to be included in the show will be automotive and industrial parts, sporting goods, agricultural equipment, office and home furnishings and equipment, advertising displays, and dozens of miscellaneous items.

Plastics Engineers' Show

THE Society of Plastics Engineers will hold its third annual plastics show and exhibition in Chicago, Ill., at the Navy Pier, as well as convention at the Congress Hotel, from January 28 to February 2, 1947, it was announced by the Society's general chairman, J. O. Reinecke, of Barnes & Reinecke, Inc. W. B. Hoey, 208 Theatre Blvd., Birmingham, Mich., executive secretary of the Society, will act as exhibits chairman.

Extensive plans for the show are being made by a committee whose members follow: W. L. Mess, Anesite Co., and R. G. Chollar, National Cash Register Co., chairman and vice chairman, respectively, of the meetings committee; C. C. Henry, Chicago Die Mold Corp., chairman of the speakers committee; H. J. McGowan, Bakelite Corp., chairman of the finance and budget committee; J. A. Boyajian, Product Mfg. & Engineering Corp., and M. H. Froelich, Ziff-Davis Publishing Co., chairman and vice chairman, respectively, of the publicity committee.

Other committee chairmen are: registration, L. H. Amrine, Imperial Molded Products Corp; reception, A. Lovgren, Industrial Molded Products, Inc.; decorations, F. Wilson, Barnes & Reinecke; ladies committee, Miss M. Wirth, Imperial Molded Products; and printing, J. H. Day, Case School of Applied Science.

CALENDAR

Oct. 1.	Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.
Oct. 4.	Boston Rubber Group. Copley Plaza Hotel, Boston, Mass.
Oct. 7-11.	National Safety Congress and Exposition. Chicago, Ill.
Oct. 17-18.	New England Section, Society of the Plastics Industry, Inc. Annual Meeting. Equinox House, Manchester, Vt.
Oct. 18.	New York Rubber Group. Hotel McAlpin, New York, N. Y.
Oct. 18.	Detroit Rubber & Plastics Group, Inc. Detroit Leland Hotel, Detroit, Mich.
Nov. 11-Dec. 7	"Buy Extra United States Savings Bonds" Drive.
Nov. 12.	Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.
Nov. 22	Akron Rubber Group, Mayflower Hotel, Akron, O.
Dec. 2-6.	American Society of Mechanical Engineers. Annual Meeting. New York, N. Y.
Dec. 2-7.	Seventeenth National Exposition of Power & Mechanical Engineering. Grand Central Palace, New York, N. Y.
Dec. 3.	Los Angeles Rubber Group, Inc. Mayfair Hotel, Los Angeles, Calif.
Dec. 13.	New York Rubber Group. Christmas Party. Hotel McAlpin, N. Y.
Dec. 13.	Detroit Rubber & Plastics Group, Inc. Detroit Leland Hotel, Detroit, Mich.

Pyroxylin-Coated Fabrics and Paper

THE following are the figures for pyroxylin-coated fabrics and paper for the second quarter of 1946, as reported by the Bureau of the Census, United States Department of Commerce. The statistics are based on reports from 28 companies in April and May and 27 companies in June (one plant having been destroyed by fire) and represent the operation of processors who coat or impregnate fabrics or paper with soluble cotton or pyroxylin preparations, either separately or in combination with other materials. "Light" cotton fabrics include sheetings and print cloths; "Heavy" cotton fabrics include drills, ducks, sateens, broken twills and moleskins.

	April	May	June
		Linear Yards	
Total (except non-fabric materials):*			
Shipments	8,649,507	9,071,392	7,653,346
Unfilled orders:†	13,605,805	13,182,026	13,467,621
Light cotton fabrics:			
Shipments	4,134,115	4,510,420	3,305,392
Unfilled orders†	5,986,369	5,947,381	6,077,328
Heavy cotton fabrics:			
Shipments	2,467,440	2,534,588	2,301,460
Unfilled orders†	5,323,326	4,959,832	5,174,568
Custom coating‡			
Shipments	2,047,952	2,026,384	2,046,494
Unfilled orders†	2,296,110	2,274,813	2,215,725
Non-Fabric Materials:			
Shipments	308,693	405,053	447,413
Unfilled orders†	716,541	830,803	823,586
		Pounds	
Pyroxylin actually spread	6,810,612	6,813,875	5,748,121
Monthly capacity:§	16,907,597	16,507,597	16,417,587

* Data include an undermined quantity of custom coating of non-fabric materials.
† Orders on hand at the close of the month, exclusive of contracts, with shipping dates unspecified.
‡ Data for fabrics other than cotton are included with custom coating to avoid disclosing data for individual establishments.
§ Based on all machines suitable for pyroxylin coating, assuming 600 working hours per month and entire production on 53"—1.32 sateen coated to a finished weight of 17.5-oz. per linear yd., assuming 40% solids.

Revised Rubber Chemicals Market Listing

THIS issue marks the appearance of a revised listing of market quotations for rubber compounding ingredients. It should be noted that the products are classified according to their actual functions in compounding, based on their chemical compositions, and will therefore show some disagreement with other currently published classifications. Products having more than one primary function are given appropriate multiple listings.

Space limitations prohibit the inclusion of all rubber chemicals available commercially, but the new listing is believed to be fully representative of the many types of products used in rubber compounding. The cooperation of suppliers is requested in submitting their latest price quotations in order to keep this listing as up to date as possible. Comments and suggestions for the further improvement of the listing are invited.

The new market listing will appear every third month commencing with this October issue. Interim changes or additions in price quotations will be published in the intervening monthly issues.

Foreign Trade Opportunities

The firms and individuals listed below have recently expressed their interest in buying in the United States or in United States Representations. Additional information concerning each import or export opportunity, including a World Trade Directory Report, is available to qualified United States firms and may be obtained upon inquiry from the Commercial Intelligence Unit of the United States Department of Commerce, or through its field offices, for $1 each. Interested United States companies should correspond directly with the concerns listed concerning any projected business arrangements.

Export Opportunities

Bernardo Delfiner, of B. Delfiner, S. R. L., Sarmiento 212, Buenos Aires, Argentina: plastic manufactures.

B. Pincus, of Pincus y Cia., Alsina 1367, Buenos Aires, Argentina: rubber thread, druggists' rubber sundries.

Delsart & Fils, 152 Blvd. de Smet de Naeyer, Brussels, Belgium: corset and garter fabrics, suspenders, elastic cloth.

Henri Francart, 25 Rue Clerbois, Soignies, Belgium: cotton gabardine cloth (impregnated or rubberized) for making waterproof garments.

(*Continued on page 140*)

RUBBER WORLD
NEWS of the MONTH

Highlights—

The unexpected large surplus of natural rubber piling up in the Far East and in London, just at the time when another International Rubber Conference was being held in Washington during late September, seemed likely to result in a lower price for natural rubber during 1947 and an increased amount over and above what was previously considered might be available to the United States during the coming year. It is quite probable that the international allocation of natural rubber might be discontinued in 1947, although buying, selling and price fixing will continue to be done by the government concerned rather than by private individuals or firms. The rubber goods producing industry in the United States may operate at a lower rate during the remainder of 1946 because of the processing problems involved in reconverting to the use of larger amounts of natural rubber, continuing component material shortages, and lower productivity of labor. The URWA at its national convention in San Francisco authorized its international policy committee to hold a conference on October 21 for the purpose of considering ways and means of making new wage increase demands.

Production Rate Still at High Level; Natural Rubber Supply and Price Problem Discussed

The production of rubber products was at a high level during September, having regained somewhat from the lower rate experienced during the earlier summer months. With greater shortages of certain component materials, particularly textiles, probable during the last quarter of 1946, that portion of the rubber industry dependent on these materials may have to reduce its production rate somewhat. Another problem plaguing manufacturers is the lower milled stock output by virture of increasing amounts of hard milling types of natural rubber they are forced to use. The growing surplus of natural rubber in the Far East and the question of what the price of this rubber should be following the end of the agreement with the British, French, and Dutch producers on December 31, 1946, were the cause of much discussion both in government and industry circles. The whole rubber industry mourned the passing of C. W. Seiberling, one of its pioneer industrialists and founder with his brother, F. A. Seiberling, of the Goodyear Tire & Rubber Co., as well as the Seiberling Rubber Co.

The Natural Rubber Situation

More information became public during September on the natural rubber supply situation in the Far East and its bearing on the future price of this rubber. The United States, which had agreed to buy only 145,000 long tons of natural rubber during the last half of 1946, has already bought and paid for this amount and still the rubber from Malaya, the Netherlands India, and Indo-China continues to arrive in Singapore at an increasing rate. Great Britain has agreed to buy all the surplus, but stocks are already high in the United Kingdom; and unless this rubber is moved to other consuming countries, the pressure for a lower selling price will become very great. One report from Singapore gives the cost of production of estate rubber at the present time as 11.3¢ a pound and that of the native producers as only 8.9¢ a pound. At the 23½¢ a pound price paid by American buyers, this provides a nice profit for the rubber growers, but since synthetic rubber in the United States probably could be sold for 17¢ a pound, and even with the extra 4¢ a pound considered necessary as added processing cost as compared with natural rubber, natural rubber in the United States, if the consumer paid the full cost of 26¢ a pound, would not be a very great bargain. Consequently, much uncertainty surrounds the supply and price situation for natural rubber during 1947.

Department of Commerce Report

Rubber production in the Far East and Ceylon will probably total 600,000 long tons in 1946 and 950,000 long tons in 1947, according to E. G. Holt, rubber advisor to the United States Department of Commerce, who recently returned from a three-month trip to the Far East. Mr. Holt visited Siam, Malaya, Netherlands India, and Indo-China and also gathered information on British Borneo (Sarawak, North Borneo, Brunei, and Labuan) during his trip to investigate rubber production, sponsored jointly by the Department of Commerce and the Rubber Development Corp. of the RFC.

Potential capacity for rubber production in the area was estimated by Mr. Holt at approximately 1,650,000 long tons a year, and a good start has been made toward getting production under way, he said. Natives and small-holders have been particularly enterprising in this regard, and production on large estates in British Malaya has also made rapid headway. Not much progress has been made, however, on the rubber estates in Indo-China and British Borneo, and in the Netherlands India production on estates is almost negligible, being limited to those properties located in Borneo, Celebes, and Riouw, the areas under Dutch control. In the territory under nominal Indonesian jurisdiction, in Java and Sumatra, the rubber estates are now inactive with very few exceptions.

Before the war approximately 55% of the rubber produced in the Far Eastern areas came from estates of 100 acres and more in size and about 40% from small-holders. The outlook for the future is that a larger share of the Far East's rubber production will come from the small-holders, Mr. Holt said. In 1947, he estimated, small-holders will produce well over 60% of the rubber.

This postwar increase in the importance of small-holders is regarded as significant in the Far East, he added, and the British Colonial Office is now making a study of Malayan small-holders. Political considerations appear to make restrictions on native production less feasible now than in prewar years, and the large estate producers therefore seem likely in the future to experience more severe competition from the native producers than before the war.

The American buying price on 20¼¢ a pound prevailing up to June 30, 1946, did not retard the resumption of production by either estates or natives. The estates were resuming operations as a matter of policy, in many cases without regard to immediate profits during the first half year of operations, Mr. Holt said. The natives are eager to produce as much rubber as they can, because for the first time since 1941 they have a market for their product and an opportunity to earn a cash income.

The following summary of outlook for rubber production in the Far East, prepared by Mr. Holt, is based on the assumption that there will be a continued, if gradual, improvement in general economic conditions in the Far East.

ESTIMATES OF FAR EASTERN RUBBER PRODUCTION
(In thousands of Long Tons)

Natives and Small Holders

Country	Potential Capacity	Estimated Production 1946	Estimated Production 1947
Malaya	265	175	235
Netherlands India	450	135	235
Siam	51	16	38
British Borneo	45	18	35
Ceylon	35	30	30
Indo-China	(native industry negligible)		
Total Native	846	374	573

Estates Over 100 Acres

Country	Potential Capacity	Estimated Production 1946	Estimated Production 1947
Malaya	335	145	235
Netherlands India	300	5	20
Siam	9	3	7
British Borneo	18	7	15
Ceylon	65	50	50
Indo-China	80	20	50
Total Estates	807	230	377

U. S. Rubber Plantations Resume Operations

The Malayan plantations of the United States Rubber Co. are being rehabilitated at a cost of $3,000,000, and production during the fourth quarter of this year will total nearly 6,000,000 pounds of smoked sheet, according to Herbert E. Smith, president of that company. He added that this rubber is being produced at a high cost and with improvised equipment.

As rehabilitation progresses, the company's plantations will be converted to the production of latex, although no latex will be available for shipment for some time, Mr. Smith said. Rehabilitation work is expected to be 60% completed in 1947 and 100% completed by the end of 1948.

U. S. Rubber's Malayan properties now contain 27,261 planted acres, which have a potential yield of 900 pounds an acre per year, or double the yield of the average Malayan estate before Japanese occupation, it was said. Regarding the com-

pany's Sumatra plantations, Mr. Smith stated that no production is possible at the present time.

"Conditions in the Netherlands Indies are still so unsettled that no survey party has, as yet, been permitted to visit our properties in Sumatra," Mr. Smith explained.

One of the first pictures of natural rubber production to reach this country since the war showing the natives handling uncured sheets on U. S. Rubber's Malayan plantations is shown in the accompanying illustration. The rubber has been coagulated and milled and will now be hung in the smokehouse for the production of smoked sheets. The roof of the building in the background was removed by the Japanese because of the tin it contained.

Natives Handling Uncured Sheets on United States Rubber Co. Malayan Plantations on Postwar Production Begins

Miscellaneous Reports

Other reports from the Far East, for example, those by George Weller of the Chicago Daily News Foreign Service, mention the controversy that exists between the British, the Dutch and the Indonesian republic on the subject of trade the Indonesians have been doing with the British at Singapore with rubber from Sumatra and other Netherlands India territories. In the first seven months of 1946, it was said that 65,000 tons of rubber were landed in Singapore by the traders in Indonesian rubber. The Dutch are opposed to this trade because it evades their export taxes, and their naval patrols are out trying to catch the Chinese junks and other craft used to transport the rubber to Singapore. The Indonesians have not actually confiscated the Dutch rubber plantations and still admit Dutch ownership, it was said. They still keep books for the absent proprietors and are taking out of the sales receipts, only their wages.

A report in the *New York Times* from Singapore, dated September 18, stated that the market price for rubber was dropping, owing to accumulation of stocks resulting from the Board of Trade's inability to absorb all Malayan production at the fixed price of 23½¢ a pound. Rubber growers were unable to find any buyers in the Singapore market at prices almost 10% below the controlled price, it was stated. Singapore warehouses are becoming clogged with rubber, and storage charges are mounting. Some producers feel it would be better to sell at a lower price rather than perpetuate wholesale stoppage which is developing at Singapore, the report added.

An Associated Press report from Singapore under the date of September 25, also mentioned the unexpectedly large Malayan rubber production and the difficulty that this situation created for the British Government in its negotiations in Washington at present on the subject of a new Anglo-American agreement on the amount and price for rubber to be purchased during 1947. It was suggested that the British might ask the United States to purchase a sizable portion of the stock on hand in Malaya, for delivery before the first of the year when the existing agreement expires.

Stagnation of the rubber trade has greatly increased Malayan sentiment for the return to a free market. A drop in price was considered possible, if not at once, probably in the form of a continuing long-term downward trend.

Another report from Washington, dated September 25, stated that a rubber price agreement providing for at least 10,000 tons of natural rubber at 20¼¢ a pound had been negotiated with the Netherlands Government. This rubber is additional to that covered by the agreement of June 21 of this year which provided for 25,000 tons at a price of 23½¢ per pound, as part of the agreement for 145,000 tons from the British, Dutch, and French Governments, acting as a unit. It is considered that this break in the united front of the governments of the three largest natural rubber producing countries is quite significant, if confirmed.

Another AP report, dated September 26, from Washington stated that the United States is expected to increase its crude rubber purchases from British-controlled areas as a result of the international rubber conference now in progress in Washington. Such an increase will probably depend on what price concessions can be arrived at. A definite announcement regarding the agreement with the British was promised for the first week in October.

An AP report from London, dated September 26, contained the information that the Washington conference agenda includes a review of the entire world supply situation, with special reference to future policy on international allocations —considered in trade quarters to be no longer necessary in view of rapidly increasing stocks. Stocks in storage in the United Kingdom at the end of July totaled 105,497 tons.

Restoration of a free rubber market in London at an early date is expected in British rubber circles. Just how completely "free" the market in rubber could be at the present time, is difficult to determine. The abandonment of international allocations would be one type of freedom, but since the United States is committed to government purchasing of rubber until the middle of 1947, direct negotiations between private producers and private consumers in the United States before mid-1947 are unlikely. A lower natural rubber price during 1947 seems assured, however.

Domestic Prices Still 22½¢

As was mentioned last month, the price to consumers in the United States of natural rubber will be maintained at 22½¢ a pound for No. 1X ribbed smoked sheets until January 1, 1947. In a memorandum to the rubber manufacturing industry under the date of September 12, the Office of Rubber Reserve, RFC, stated that on September 5, John R. Steelman, Director of OWMR, directed RFC to maintain the basic sale price on natural crude rubber at 22½¢ a pound until January 1. The Office of Rubber Reserve notified manufacturers on July 26 that all sales of natural rubber would be made on a *pro forma* basis until the price decision was reached, and since all payments were made on the basis of the 22½¢ per pound price, they may now be considered final, and no adjustments will be required.

Current Industry Operations

As measured by the consumption of rubber, industry operations declined during July although tire production as reported by The Rubber Manufacturers Association, Inc., dropped only about 1%. However with 32,000 long tons of natural rubber allocated to the industry for July, only about 22,000 tons were used, and the consumption of GR-S during July was only about 44,000 tons, as compared with more than 53,000 tons in June. Consumption of natural and synthetic rubbers of all types for July was about 75,700 tons as compared with 79,400 in June. The amount of reclaim used decreased only slightly from about 22,000 tons in June to 21,000 tons in July.

It is understood that at the present time there is too great a proportion of tough grades of natural rubber in that being allocated to consumers and that, consequently, most companies are experiencing lower milled stock output efficiency. This reduction in efficiency is similar to that which took place when the conversion from natural to larger amounts of synthetic rubber was required in 1943 and 1944, and in spite of the large number of new and improved processing machines that have been installed both during and since the end of the war. Of course with the unprecedented record consumption of

rubber of all kinds, much old machinery and new operators must be used, and apparently this more than counterbalances the effect of such new equipment as is in operation.

Information from one source on the productive efficiency of labor since the war ended indicates that indices calculated from total rubber consumed, including reclaim; the number of employes in the industry as reported by the U. S. Department of Labor; and the man-hours worked each week; reveal that the productive efficiency of the industry during May and June of 1945 matched that of the prewar years of 1939 and 1940, but that estimates for June and July of this year show a drop to an efficiency about equal to that calculated for the middle 1930's.

The RMA monthly report on tire production for July mentioned that several factors worked against high production in that month. Many plants were shut down for inventory and vacations during the first week of the month, and strikes closed two factories for the entire month. Despite these conditions, July production rose to 4,923,968 units in passenger car sizes, a slight increase over June. Production of truck and bus casings, however, declined 4.8% from the June figure; 1,061,226 units were turned out as compared with 1,114,797 units in June. The accompanying report covers only passenger-car and truck and bus casings, but does include figure on passenger, truck, and bus tube production.

The RMA pointed out that although passenger-car tire shipments reached a record during the first seven months of 1946, the day when motorists can walk into a dealer's shop and buy new tires "all the way around" is still months away. Rising automobile production is claiming a larger proportion of monthly tire output than it did early in 1946. As a result, monthly allotments to tire dealers may be somewhat under April and May levels for the time being.

The RMA also released figures covering estimated monthly shipments, production, and inventory of automotive inner tubes for the years 1941 through 1945. These complete tables will be published in an early issue of INDIA RUBBER WORLD.

The Rubber Bureau of the Civilian Production Administration is making a survey of the supply demand picture on passenger-car tires in order to make its decision regarding the fifth, or spare, tire not permitted on new automobiles up to October 1. In view of the inability of manufacturers to supply dealers with enough replacement tires to build up their inventory, it is doubtful if the "no spare tire" rule will be relaxed as yet.

Another complication for the tire makers is the shortage of rayon cord, which, because of the smaller than usual cotton crop, will have its effect both on rayon and cotton tire cord production. In addition, because of the present OPA pricing system on cotton products, the price of cotton tire cord is higher than that for rayon tire cord. Any increase in the use of cotton tire cord, particularly for the larger-size tires, will result in an increased consumption of natural rubber per tire produced.

Labor-Management Relations

The convention of the United Rubber Workers of America, CIO, held in San Francisco, Calif., the week of September 16, furnished most of the news in the industrial relations field during the past month. Contrary to expectations, contracts were not signed during September by the local unions at Akron and other plants of the Goodrich and Goodyear companies, or by the local unions at most of the United States Rubber plants. The trial examiner for the NLRB in Cleveland ruled on September 18 that The B. F. Goodrich Co. was guilty of unfair labor practice in refusing to bargain with the Foreman's Association of America at its Akron plant. As reported previously, the company has a suit now pending in the federal district court on the question of whether a company must recognize and bargain with foremen's associations.

The URWA Convention

One of the major actions taken at the San Francisco convention at the NRWA was an amendment written into the constitution of the union that provides for an international policy committee made up of representatives from all the local unions and the officers of the international union, and the scheduling of a union wage policy conference for October 21. Although the amendment establishing this policy committee will not become effective until November 1, delegates to the convention were instructed to appoint men for a temporary committee until permanent members are elected.

Apparently the URWA is not satisfied to continue to support for too long the new policy of the CIO of restraint on new wage demands as announced during August. A large number of resolutions were offered at the convention calling for an immediate reopening of the wage question, but it appears that the wage demands will be delayed until after Election Day. It is expected that the first pressure will be directed at the Big Four rubber companies. Under the Big Four agreement of March, 1946, the wage question can be reopened only on a four-company basis and only "if economic conditions warrant." This Big Four agreement has six more months to run.

More than 80 resolutions were presented by representatives of the different local unions on such matters as shortening of the work week to 30 or 36 hours, the formation of an "American Labor Party," an embargo on tire and rubber goods shipments to Canada, and the formation of cooperative stores for union members.

L. S. Buckmaster was reelected president of the international union, and vice-president H. R. Lloyd and secretary-treasurer Charles E. Lanning were also returned to their respective offices. Only five incumbent members of the international executive board retained their offices; while seven new members elected to the board were from local unions in Akron, Mishawaka, Detroit, Los Angeles, and Buffalo.

Mr. Buckmaster, in his acceptance talk, promised to carry on the principles of unionism along the lines of American democracy.

"Our organization is what may be termed a democratic organization," he said. "I believe it is democratic in the best sense of the word."

He also urged the delegates to instruct unionists to participate in government affairs, not only in union affairs, but also in the business of their country.

Union dues were increased from $1 to $1.50 a month per member "to enlarge the strike and defense fund." In support

ESTIMATED AUTOMOTIVE PNEUMATIC CASINGS AND TUBE SHIPMENTS, PRODUCTION, AND INVENTORY—JULY-JUNE, 1946.—FIRST SEVEN MONTHS 1946 AND 1945

	Original Equipment	Replacement	Export	Total Shipments	% of Change From Preceding Month	Production During Month	% of Change From Preceding Month	Inventory End of Month	% of Change From Preceding Month
PASSENGER CASINGS									
July, 1946	1,121,659	3,840,337	48,135	5,010,131	— .70	4,923,968	+ .05	2,051,732	—10.41
June, 1946	710,732	4,279,041	55,769	5,045,542		4,921,297		2,290,220	
First 7 months, 1946	4,649,537	30,358,028	323,894	35,331,459		35,661,085		2,051,732	
1945	178,079	11,620,748	108,573	11,907,400		11,980,380		1,016,615	
TRUCK AND BUS CASINGS									
July, 1946	407,436	769,595	59,430	1,236,461	+13.60	1,061,266	— 4.80	838,737	—17.69
June, 1946	213,876	796,090	78,504	1,088,470		1,114,797		1,019,009	
First 7 months, 1946	1,949,326	6,300,101	447,766	8,697,193		8,763,992		838,737	
1945	3,613,009	7,441,745	111,233	11,165,987		11,231,561		782,877	
TOTAL CASINGS									
July, 1946	1,529,095	4,609,932	107,565	6,246,592	+ 1.84	5,985,234	— .84	2,890,469	—12.63
June, 1946	924,608	5,075,131	134,273	6,134,012		6,036,094		3,309,229	
First 7 months, 1946	6,598,863	36,658,129	771,660	44,028,652		44,425,077		2,890,469	
1945	3,791,088	19,062,493	219,806	23,073,387		23,211,941		1,799,492	
PASSENGER, TRUCK AND BUS TUBES									
July, 1946	1,513,374	4,344,498	101,322	5,959,194	+ 4.54	5,701,851	— .14	3,954,149	— 9.65
June, 1946	931,238	4,647,849	121,231	5,700,318		5,709,905		4,376,589	
First 7 months, 1946	6,683,658	30,922,690	732,347	38,338,695		39,342,207		3,954,149	
1945	3,816,004	18,539,152	163,567	22,518,723		22,900,631		2,542,804	

of the strike of 10,000 rubber workers in Canada, which began the latter part of June, the international union is understood to have contributed $80,000.

Miscellaneous Items

Although it was reported last month that the local unions at the Akron plants of the Goodyear Tire & Rubber Co. and the Goodrich company had about concluded their negotiations for new contracts, no such contracts were signed during September, and the same situation existed with regard to most of the local unions of another member of the Big Four, that is, U. S. Rubber. The only Big Four company which was well on its way with new contract negotiations was the Firestone Tire & Rubber Co., where the Akron local union signed during August.

The NLRB regional office in Cleveland stated on September 18 that Goodrich had been ordered to cease and desist from its refusal to bargain with the Foreman's Association of America at its Akron plant, and to cease interfering in any manner with the union's attempt to bargain for floor foremen, shift foremen, chief schedulers, and others. The next move in this case will be the case the company has pending in the federal district court in which it has taken the position that the NLRB went beyond its authority in certifying the FAA as a collective bargaining agent for Goodrich foremen.

OPA Price Changes

Specific standards must now be complied with to qualify factory seconds, factory rejects, and scrap tires for the maximum prices established on these three types of irregular new tires, according to Amendment 10 to RMPR 528—Tires and Tubes, Recapping and Repairing, and Certain Repair Materials; Amendment 14 to RMPR 143—Wholesale Prices for New Rubber Tires and Tubes; Amendment 16 to RPS 87 — Scrap Rubber — all effective September 11, 1946. This action is designed to eliminate confusion and prevent upgrading in these tires, each of which has a different ceiling. Sales by both manufacturers and dealers are subject to the new specifications.

Heretofore manufacturers observed various standards in branding tires as factory rejects or factory seconds as well as in destroying their worst tires; so they could be sold as scrap. Dealers have followed the manufacturer's branding in determining these categories.

The new definitions, based on general industry practices and discussed with representative manufacturers, follow:

Factory Seconds: A new tire which has surface blemishes such as surface sidewall cracks which do not extend to the cord body and which have been removed by buffing or spot repairing, tread design defects, missing letters, or other such irregularities which do not interfere with the use of the tire on the wheel of a vehicle and which, without further repair, will render substantially the same service as a new first.

Factory Rejects: A new tire having pinched beads (beads being more than two-thirds of intended width), small ply or tread separation, fabric extending beyond toe of bead, slight band ply irregularities, foreign matter cured into carcass, or other such minor defects which can be satisfactorily repaired for use on the wheels of a vehicle.

New Scrap Tires: A new tire having badly buckled plies due to creased airbags, plies omitted, plies trimmed at bead toe owing to excessive pinch at bead, beads two-thirds or less of the intended width, broken wires, more than one ply of tire soft or spongy, open cords due to leaky airbags, or other such defects which render the tire unfit for use on the wheel of a vehicle.

Order 39, RMPR, establishes maximum prices for all sales of Universal S-2 slip-on lawn mower tires manufactured by S. & G. Rubber Co., Los Angeles, Calif. Orders 40, 41, establish maximum retail ceilings for new sizes of tractor logger and Ground Grip, and Spade Grip (rice-cane) tractor tires, respectively, of the Firestone Tire & Rubber Co.; and Order 43, for one garden tractor and two Sure Grip tires and two tractor tubes, Goodyear Tire & Rubber Co.; Order 42, two logger tires of S-11 rayon construction, Gates Rubber Co.; Order 44, two wheelbarrow casings and tubes, United States Rubber Co.; Order 45, 14 sizes of stop-start truck tires, Goodyear.

Amendment 17 to MPR 478—Coated and Combined Fabrics—and Amendment 14, MPR 406—Synthetic Resins and Plastic Materials and Substitute Rubber—cover the transfer of supported vinyl resin sheetings from 406 to 478 because vinyl resin sheetings and fabrics coated with vinyl resins, although produced by different processes, serve the same purpose and are physically indistinguishable from each other. In addition the same manufacturers make both products. Besides supported films are a small part of the large field of coated fabrics, and since MPR 478 governs the prices for coated fabrics, while MPR 406 is basically a raw materials regulation, coverage of supported vinyl resin sheetings belongs under 478.

The following orders have been issued for MPR 478, establishing ceilings for pyroxylin and vinylite coated fabrics for the firms indicated: Nos. 202 and 203, Weymouth Art Leather Co., Inc., South Braintree, Mass.: No. 204, A. F. (Smally) Schmalzried & Co., Dallas, Tex.; No. 205, Unity Leather & Textile Co., Boston, Mass.

Order 166 under 3 (e), GMPR, authorizes maximum prices for all sales of Brite-N-Up rubber sponge wallpaper cleaner made by Durable Rubber Products Mfg. Co., 1481 W. Huron St., Chicago 22, Ill.

Order 317, MPR 64, sets maximum prices for two models of electric ranges to be sold by the Firestone company; while Order 819, MPR 591, gives the ceilings for a Firestone food freezer.

Removed from Price Control

Certain cosmetics and a number of miscellaneous industrial and medical items not significantly affecting living or business costs were suspended indefinitely from price control by Amendment 51 to SO 129. Among the products affected are:

1. Tire reliners made from new and scrap materials and tire patches and boots made from scrap materials. (Increased amounts of new passenger tires have resulted in a proportionate reduction in the need of these repair items which were used as temporary expedients.)

2. Tire valves and pneumatic oral inflated valves. (The industry manufactured essentially the same items before the war, OPA explained, thus removing any serious reconversion problem. Supply is ample.)

3. Flooring and wall covering pastes and cements (used to bind linoleum, felt-base floor coverings, and tiles to floors or walls).

4. Gloves, finger cots, and sleeves for medical, surgical, obstetrical, autopsy, and mortuary purposes.

5. Hard rubber goods for medical, surgical, veterinary, mortuary, and laboratory equipment and parts.

6. Obstetricians', surgeons', and urologists' aprons.

7. Operating cushions.

8. Patients' bibs and throws.

9. Tubing, stopples and irrigators for medical, surgical, mortuary, veterinary, and laboratory purposes.

The above druggists' sundries generally are sold to doctors, hospitals and clinics, rather than to individual consumers through the retail trade. These products are in most cases hand made, and productive capacity and available supplies exceed demand.

Exempted from controls are safety gas main bladders and shoe bladders.

Among other products suspended from price control are: racing car tires and tubes (Amendment 53, SO 129); and used and recapped airplane tires (Amendment 54).

OPA explained that used airplane tires and recaps are of limited value for use on a truck or bus as they are made for maximum traction and cushioning rather than speed and even after having their tread changed are not so satisfactory as regular bus or truck tires. Moreover special rim attachments must be employed to fasten these tires on wheels of ground vehicles. Demand for used airplane tires is small, limited largely to drivers using them for special purposes, as postmen driving trucks in snow drifts. Reports show that these tires are selling far below ceiling levels so that Amendment 54 should not cause a price increase.

At the same time OPA extended its exemption of recapping and repairing of airplane tires for airplane use to include these services to all used airplane tires for all uses.

Revisions in R-1

Most of the smaller sizes of truck tire tubes have been added to the types which may be made only from natural rubber, in order to channel the short supply of Butyl into the production of passenger-car tire tubes, W. J. Sears, director of the CPA Rubber Division, said September 20. At the same time permission was granted to make certain special types of truck tires such as "store door delivery" and "stop-start" types heretofore prohibited. These will be allowed the same percentage of natural rubber permitted in other types of tires of the same size.

Allocation of natural rubber was placed on a quarterly basis to correspond with issuance of authority to acquire GR-S as an aid to manufacturers in scheduling production.

Also, use of more natural rubber was authorized for making tire flaps and full circular curing tubes, and provision was made for the purpose and consumption of chlorinated natural rubber without CPA authority, provided it is used only for permitted purposes. Chlorinated rubber and other privately produced syn-

thetic rubbers which may be purchased without CPA authorization remain subject to inventory restrictions.

These actions were taken in Amendment 1 to R-1 and Amendment 2 to Appendix II, both effective September 20.

Hereafter the use of natural rubber is mandatory in the manufacture of all truck tire tubes having a cross-section of 7.00 inches and up. Previously the use of Butyl was required in the manufacture of truck tire tubes with a cross-section of less than 8.25 inches. Its use is optional in making certain sizes of tire tubes for tractors, implements, etc. Passenger-car tire tubes still may not be made of natural rubber.

Mr. Sears explained that sufficient natural rubber is available for this increased use because the rubber manufacturing industry during July fell short of consuming authorized quantities.

All types of tires for trucks, having a cross-section of 8.25 inches and up, may now be manufactured with 94% natural rubber. Previously the types of tires which could be made with this percentage of rubber were specified in the order.

Tire flaps of 12-inch cross-section and over may now be made of natural rubber, those with 11-inch cross-section and smaller with 50% natural rubber. Previously natural rubber used in making any size of tire flaps was limited to splicing cement and identification inks. Full circular curing tubes may now be made entirely of natural rubber. Previously all except a few types were limited to 4% natural rubber.

General-purpose synthetic (GR-S) may now be used without limit for experimental purposes, but experimental products cannot be offered for sale. Butyl may be consumed experimentally up to 200 pounds a month per user, but no natural rubber latex or chlorinated natural rubber may be consumed for experimental purposes except on specific authorization by CPA.

An export quota for the third quarter of 745,000 pounds of high tenacity rayon has been established for Canada, CPA announced September 12. At the same time an amendment has been added to Appendix II, List 15, of R-1, providing that Canadian manufacturers using tire-type high-tenacity rayon cord fabric or yarn may obtain material under the quota if their purchase orders are approved by the Canadian Rubber Controller. The amount granted in the quota is to supplement Canadian third-quarter production of approximately 1,000,000 pounds and is necessary if Canada is to fill essential replacement needs for truck, bus, and special large army tires. None of the cord will be used for tires for tractors, road machinery, or passenger cars.

Canada has not had a quota for high-tenacity rayon from this country since the war ended, but a decrease of production of this type of rayon in the Dominion makes it advisable to reinstate the quota system. However, CPA pointed out, the 745,000 pounds represents a ceiling and not a positive commitment.

Among the many changes in Supplementary Order M-317A, as amended August 27—Cotton Fabric Distribution—is a broadening of the definition of the industrial and agricultural set-aside to allow chafer fabric to be used for rubber footwear other than canvas rubber-soled shoes of vulcanized construction. The definition was also clarified to show that it includes components of work gloves, work clothing, and safety clothing.

OBITUARY

Acme Pictures

C. W. Seiberling

C. W. Seiberling

A BELOVED veteran of the rubber industry is no more. After a brief illness Charles Willard Seiberling, cofounder, first vice president, treasurer, and a director of the Seiberling Rubber Co., Barberton, O., died September 20 at the Akron City Hospital.

Born in Western Star, O., January 26, 1861, he attended Akron public schools and then Oberlin College from 1878 to 1880.

His first venture into the commercial field was with his brother, Frank A. Seiberling, operating an interest of their father, the Akron Street Railway Co. Finding this venture unprofitable, in 1880 they joined their father's farm implement factory, the Empire Mower & Reaper Works, which was liquidated in 1896.

Then in 1898 F. A. and C. W. Seiberling organized the Goodyear Tire & Rubber Co. in Akron, but, after many years of success, during which the deceased served as a vice president and a director, the depression (1921) caused the Seiberlings to lose their shares in the company. In 1921, however, the undaunted brothers founded the Seiberling Rubber Co., in which C. W. Seiberling remained active until a few days before his death.

During all the years he also held many other positions, among which were: director and superintendent of the J. F. Seiberling Co. (1885-95); secretary and a director of Akron India Rubber Co. (1895-98); president of Thomas Phillips Co., of Seiberling Latex Products Co. (1928-46) and its subsidiary, New Bremen Rubber Co., and of Airport Exhibition Co.

Besides Mr. Seiberling was a director of the Akron Rubber Reclaiming Co., the First City Trust & Savings Bank, and of the First City Savings Bank of Barberton; a vice president of Macedonia & Northfield Banking Co. and of the Citizen's Savings & Loan Co.; president of the board of trustees, Kent State College; treasurer and trustee of Edwin Shaw Sanatorium; trustee and cofounder of the local Girl Scouts of America and of the Akron Children's Hospital; an organizer of the Akron Community Chest; a member and a past president of the Akron Chamber of Commerce and of the Akron City Club; and a trustee of the Boy Scouts of America, Barberton Citizens Hospital, Akron Art Institute, Akron Y.W.C.A., Barberton Y.M.C.A., and of the Akron Community Service Center. The deceased, moreover, was a member of the Parent-Teacher Association, the Better Business Bureau, Barberton, Ohio, and national Chambers of Commerce, Akron University Endowment Association, Ohio Society of New York, East Akron Board of Trade, and Akron University, Rotary, Portage, Fairlawn, and Congress Lake Country clubs.

Public funeral services were conducted September 23 at the Trinity Lutheran Church, followed by private services and burial at Northfield Cemetery.

A widower, he leaves, besides his brother, two sons, a daughter, five sisters, and five grandchildren.

Hugo Fuchs

HUGO FUCHS, former general manager of the Austrian-American Semperit rubber works of Austria, died at his home in New York, N. Y., September 8, from a heart ailment.

He was born in Prague on October 2, 1883, and received his early education there. In 1906 he was graduated from the Institute of Technology at the University of Prague; then in 1910 he was awarded the degree of doctor of technical sciences. In 1912, 1913, and 1914, Dr. Fuchs won a scholarship that enabled him to spend several months in Germany (Materialprufungsamt, Grosslichterfelde, and the Deutche Kahneisengesellschaft) and then at Columbia University, New York, as a guest student.

Meanwhile in 1908 he had been appointed assistant at the Institute of Technology and at the same time became secretary of the International Institute of Techno-Bibliography and assistant editor of the technical and economics magazine, *Rundschau fur Technik und Wirtschaft*. In 1911, Dr. Fuchs had been named a professor at the Technical College in Pilsen, Czechoslovakia, which post he held until 1921. During the same years, except for 1915 to 1918 when he was a commissioned officer in a railroad regiment in the First World War, he served as industrial and technical adviser of the Anglo-Austrian Bank, followed by five years as industrial adviser and director of the Bohemian Commercial Bank in Prague. From 1920 until 1926 he had also been an assistant professor at the Institute of Technology at his Alma Mater.

The next year Dr. Fuchs was made a director, then managing director and a member of the board of the Semperit Austro-American Rubber Works in Vienna. He was moreover, a counselor of trade of the Austrian Government. Following the invasion of Austria in 1938 he returned to Prague as assistant editor of the Czech Government's weekly, *East European Economist*. In 1939 he went to London, England, where he was engaged as technical adviser of Reliance Rubber Co., Ltd., and also contributed technical and economics articles to the *Rubber Age (London)*. He came to the United States in 1941.

Funeral services took place at the Riverside Chapel, New York, on September 10, with burial in New Jersey.

He leaves a wife and a brother.

EASTERN AND SOUTHERN

Du Pont Advances Thompson

E. W. Thompson, since 1942 manager of the Louisville neoprene plant, which E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., built and is operating for the government, has been appointed production manager of the company's rubber chemicals division, position a new one in the organic chemicals department.

E. F. Ridlon, assistant manager of the Louisville plant, succeeds Mr. Thompson as manager.

Mr. Thompson started in the chemical industry in 1920, upon his graduation from Denison University with a B.S. degree in chemistry. He began as a supervisor in the Newport Chemical Co., working his way up to manager of the New Brunswick, N. J., plant. He retained that position when du Pont acquired the Newport company in 1931. He has since held various managerial posts within the du Pont organization.

Mr. Ridlon came with the company in 1929, upon his graduation from the University of Maine, with a B.S. degree in chemical engineering, starting as a student operator in the rayon plant in Buffalo. During the years since, he has worked in various production and supervising capacities in the Richmond, Va., Deepwater, N. J., and Baton Rouge, La., plants.

Walter S. Carpenter, Jr., president of du Pont, announced that at midnight, August 31, the company turned over to the General Electric Co. all of the duties and activities in the performance of du Pont's contract with the government in its atomic energy program. At that time, General Electric took over the operation of the Hanford Engineer Works, Richland, Wash. When du Pont, in the Fall of 1942, acceded to the government's request to design, construct, and operate the plant for the production of plutonium, the company asked that it be relieved of the task as soon as practicable. Mr. Carpenter also stated:

"In this job, we have had the wholehearted support of the tens of thousands of men and women who joined us in accomplishing unprecedented tasks. Although there were many unknown dangers, there has not been a major injury due to hazards inherent in the process. The job done at Hanford is the greatest testimonial to the performance of the employes."

Continuous Pigment Process

Plans for installation of the first full-scale process for the continuous manufacture of precipitated pigment colors were announced by du Pont's pigments department. Installation will be made in buildings already available at the company's pigment plant in Newark, N. J. Estimated to cost $500,000, the installation is the result of extensive research and will reduce average processing time from a period of four or five days to a few hours. It will provide new facilities for the manufacture of chrome pigments. Extensive semi-works plant development has proved the value of the new process.

At present, pigment colors are made in batches employing large tanks and vats for mixing the chemicals involved. These tanks are then drained into filter presses where soluble contaminants are washed out of the precipitated pigments. Later operations include drying and grinding before the finished pigments are ready for shipment to manufacturers of rubber, plastics, paints, inks, and other products.

The new process will replace batch handling with a continuous flow of raw material and semi-finished pigments through all processing stages. This is expected to be ready for operation in five months.

Houdry Process Co., Philadelphia, Pa., because of expansion of engineering and service facilities, has moved its New York, N. Y., offices to larger quarters at 25 Broad St. from 115 Broadway. Stationed at the new quarters are R. B. Cragin, Houdry vice president, together with his staff of commercial development engineers, the Houdry process design and project analysis divisions.

Sun Oil Co., 1608 Walnut St., Philadelphia, Pa., has appointed Eugene B. Nugent manager of a new automotive sales engineering division. Dr. Nugent became affiliated with Sun Oil in October, 1943, after his discharge from the Navy, to conduct research on Diesel engines, fuels, and lubricants at the Marcus Hook, Pa., laboratories, but in March, 1944, he was transferred to Philadelphia as technical representative in the application of these products.

Erie Foundry Co., Erie, Pa., according to D. Angus Currie, president and treasurer, has appointed Harry A. Trishman manager of the hydraulic division, to direct the company's activities and aid in further development of the Erie line of hydraulic presses and other heavy equipment for processing rubber, plastics, and sheet metal. Mr. Trishman has had 25 years' experience in these fields; the last 20 years were spent as chief engineer of Adamson United Co.

Harry A. Trishman

Rainwear Convention

The first annual rainwear sales convention and fashion show, under the sponsorship of the New York Raincoat Manufacturers' Association, Inc., was held September 4, 5, and 6 at the Hotel New Yorker, New York, N. Y. Displays of their lines of rainwear were given during the convention by 50 companies, including Aldan Rubber Co., Celanese Corp. of America, Cravenette Co., Dan River Mills, E. I. du Pont de Nemours & Co., Inc., Royal Rubber Corp., and Rubber Fabrics Co.

A luncheon and merchandising clinic was held September 4. The position of the rainwear industry was discussed by Simon Cohen, president of the Association, during the luncheon, who stated that supply will not meet demand in the industry for at least six months, and in the case of men's raincoats an appreciably longer period may be expected. He said that the water-repellent fabric mill's and converters were still allocating supplies "with an eyedropper" and saw no immediate change in the situation. He also disclosed that the industry in New York is considering locating in one central area within the city and thus be more readily accessible to buyers.

Fred Monosson, president of the National Rainwear Manufa turers' Association, another speaker, told retailers that more intensive promotion mus. be undertaken to correct the current merchandising situation wherein rainwear "is bought, not sold." J. Harold Shipp, manager of du Pont's fine chemical division, spoke on the construction and testing of water-repellent fabrics.

At the fashion show, September 5, the most imaginative and prophetic fashion ideas for wear in rain or sun were shown. Striking fabrics were fashioned into suits and other apparel, water-repellent treated so as to look equally smart in the rain as on clear days. Designed in accordance with the latest Parisian style dictates, it seemed likely that the average layman would find it difficult to distinguish these coats and suits for wear in the rain, in view of what we have been accustomed to know as rainwear. Rayon gabardine and satin twill predominated in raincoats, but new styles were also featuring nylon, paper-thin rubber, crystal clear plastics, cotton poplins, and fine worsteds. The highlight of the men's rainwear group was a plastic suit which folded neatly into a small envelope. Also featured was a tent-like fishing suit made of a fine plastic on a silk backing, which also folded very compactly into a small envelope for easy carrying.

St. John X-Ray Laboratory has moved all its facilities to its own building at Califon, N. J.

The Electric Storage Battery Co., Philadelphia, Pa., has purchased the plant and equipment formerly owned by the Joseph Stokes Rubber Co. at Taylor and Webster Sts., Trenton, N. J., and will start operations there as soon as possible under the name of Stokes Molded Products, making the hard rubber goods that had been formery manufactured by Stokes Rubber.

Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J., has announced the return of Roland C. Morrison as one of its New England representatives calling on the textile dyeing and printing industries. Mr. Morrison, recently ordered to inactive duty in the U. S. Naval Reserve, in which he served almost three years, was graduated from Lowell Textile Institute in 1934 with a bachelor's degree in chemistry and dyeing. He joined the Silver Spring branch of the United States Finishing Co. in 1934 as a plant trainee and was made assistant superintendent of printing in 1937. When this plant ceased operating in 1938, he joined the Calco sales force, doing both sales and technical service work.

Another Calco appointment is that of John W. Dersch as project engineer of the Marietta Works, Marietta, O. Mr. Dersch, upon graduation in 1936 from the University of Michigan, with a degree in chemical engineering, joined Calco as a student engineer and in 1940 was promoted to divisional engineer of the azo dye division. Since June, 1945, however, he has been project engineer of the Brown Co., Berlin, N. H.

George L. Royer, an assistant director of the physical chemical section, research laboratories, at Calco, has been awarded one of the first Fellowships ever granted in the field of biological photography, presented by the Biological Photographic Association.

Koppers Co., Inc., Pittsburgh 19, Pa., has appointed Vice President J. N. Forker as general manager of the new tar products division and Vice President Dan M. Rugg general manager of the new chemical division. Mr. Forker was general manager of the former tar and chemicals division, and Mr. Rugg was manager of the former butadiene division. Under the new plan of operations the Kobuta, Pa., plant becomes a unit of the chemical division. Koppers now operates for the government only the styrene facilities of the large Kobuta plant which was built for the production of butadiene and styrene during the war period.

Among the other new appointments was that of J. C. Macon, Jr., as general sales manager of the tar sales department, in charge of sales of tar products and coated products of Koppers Co. Also, T. C. Keeling was made sales manager of the new chemical division.

Hamilton Rubber Mfg. Corp., Trenton 3, N. J., according to A. Boyd Cornell, executive vice president, last month appointed Ervin W. South sales manager. A vice president of the company, Mr. South will make his headquarters at the factory offices on Meade St. Mr. South entered the employ of Hamilton in 1924 as an expediter and later joined the sales department. In 1938 he became secretary of the company and in July, 1945, a vice president. He is also president of the New Jersey Rubber Manufacturers Association.

Pennsylvania Rubber Co., Jeannette, Pa., has appointed L. Bert Redding to the sales staff of its athletic goods department to cover Missouri, Kansas, Oklahoma, Arkansas, Colorado, Nebraska, and Texas.

Warren S. Lockwood

Lockwood Becomes Foreign Trade Consultant

Warren S. Lockwood, since 1944 executive vice president of The Rubber Manufacturers Association, Inc., New York, N. Y., resigned that post on September 1 to organize a consulting service in the foreign trade field. With offices initially in Washington, D. C., at 1000 Shoreham Bldg., and in London, England, the firm known as World Trade Service, will offer highly specialized services to American exporters and importers in preparation of foreign market surveys. A closely correlated service will also be offered in the form of up-to-the-minute reports to clients on new opportunities for world trade in light of changing economic conditions here and abroad. A third phase of the firm's service, according to Mr. Lockwood, will be in direct practical assistance to clients in the solution of world trade problems created by import duties, quotas, exchange, and other barriers to the free flow of goods between this nation and foreign countries.

In addition the appointment of Mr. Lockwood as vice president in charge of overseas activities of the World Trade Foundation of America, Inc., was announced by George H. Thornley, president of that organization. Mr. Lockwood is also chairman of the newly formed industrial trade associations committee of the Foundation, which held its first meeting on September 24. This committee was organized for the purpose of developing better two-way world trade understanding among the trade associations of the United States.

Mr. Lockwood left for Europe during September to establish his London office and to attend the October 15 London World Trade Conference. He will also carry on further studies of current trade conditions in the United Kingdom, France, and the Netherlands, returning to Washington on January 1.

A graduate of Dartmouth College in 1929, Mr. Lockwood served as an officer of the Trade Commissioner Service of the United States Department of Commerce in Singapore, Batavia, Washington, D. C., and London from 1929 through 1938. Following his resignation from the Department of Commerce in 1938, he made an extensive survey of rubber product developments in France, Germany, Austria, Holland, and Czechoslovakia and became director of the Crude Rubber Development Bureau in Washington, an organization financed by the rubber producing industry and devoted to research into and publicity for new rubber uses. Mr. Lockwood was with the Rubber Manufacturers Association from 1940 until 1942 and then after a brief period with the Reconstruction Finance Corp., he joined the Department of State and went to London as rubber attache at the American Embassy. In 1944, Mr. Lockwood undertook a special mission for the State Department, visiting Australia, Ceylon, and India and returning to Washington *via* London. He represented the Embassy during the exploratory postwar talks on rubber held with the British and Dutch in London in August, 1944. On October 1, 1944, Mr. Lockwood returned to the RMA as executive vice president.

David Boehm, for the past four years general purchasing agent for the Bristol Mfg. Corp., manufacturer of rubber and fabric footwear, Bristol, R. I., has severed his connection with this firm to form his own organization in New York, N. Y. With temporary offices at 358 Fifth Ave., Boehm-Smith, Inc., will buy rubber, textiles, chemicals, leather, machinery, and other supplies for manufacturers in the rubber footwear and shoe industries. The new buying organization is now under contract to buy for several clients in this country and out of the United States.

The Babcox & Wilcox Co., 85 Liberty St., New York, N. Y., plans installation of a new 2,000,000-volt X-ray machine this fall at its Barberton, O., plant. This will be the first use of a machine this size for the purpose of examining welds in pressure vessels. The cost of the equipment, together with a special building to be erected, and the installation will be $150,000. Ground has been broken for the special building, which has been designed to protect personnel from radiation and to make possible examination of the largest-size drums made by the company. This purchase raises to 12 the number of X-ray machines used by the company, which now has seven 200,000 to 250,000-volt units, one 300,000-volt unit, two 400,000-volt units and one 1,000,000-volt unit in addition to the new machine.

A final summary on the research conducted by the Babcock & Wilcox Tube Co., Beaver Falls, Pa., and Babcock & Wilcox, New York, for the Rubber Reserve Co. reveals that 30 metallurgical reports on the properties, behavior, and weldability of 27% chromium-iron and other high alloy materials were submitted and then distributed mainly to various oil companies and operators in the rubber program. The studies, made under contract for Rubber Reserve, were intended primarily for manufacturers of raw materials for synthetic rubber. Laboratory tests were conducted by the tube company, and pilot-plant and plant exposure tests were made by other operating companies participating in the metals research program. The cost of the research work exceeded $18,000 and was defrayed by the government. The research work was carried out under the supervision of H. D. Newell, chief metallurgist of the tube company.

Expanding Operations; Other U. S. Rubber Developments

To increase the output of golf balls and rubber heels, United States Rubber Co., Rockefeller Center, New York 20, N. Y., last month announced that additional production facilities will be established in Newport, R. I., in the Coddington School, a city-owned building, leased to the rubber company. It is expected that about 100 men and women will be employed. The work in Newport will consist chiefly of trimming, finishing, and golf ball winding. The rubber compounding, molding, and other preliminary processes will take place in the company's plant in Providence, R. I., which for many years has been producing golf balls and heels.

The company selected Newport as the site for its new branch because of the availability of workers in the community. This will be the company's third plant in Rhode Island. More than 1,900 men and women are employed in Providence, and some 900 in a wire insulating plant at Bristol.

Later the company reported the purchase from the War Assets Administration of modern manufacturing buildings at Milan, Tenn. The new facilities will be used for the manufacture of fabric rubber-soled casual shoes. The buildings had been units of the Wolf Creek Ordnance plant. Installation of heavy machinery, such as mills, calenders, and vulcanizers, will be started by U. S. Rubber at once. Manufacturing operations are scheduled to begin this fall.

Henry Robbins, industrial engineering manager of the Woonsocket, R. I., plant of U. S. Rubber for four years, will be general superintendent of the Milan plant. Other men from Woonsocket to hold key positions at the new plant include S. A. Bandurski, industrial relations manager; J. Tessier, industrial engineer; A. Cave, mill room foreman; C. E. Wright, cutting and stitching room foreman; Paul Tourangeau, foreman of the vulcanizing and packing department; Phil Mahoney, foreman of the mechanical department; and Don Linskey, training assignment.

In a move to diversify further its production of textile products U. S. Rubber bought the combed yarn plant of Ruby Cotton Mills, Inc., Gastonia, N. C. The purchase price was $1,300,000 for the buildings, equipment and land plus an additional sum to be determined by audit for raw materials and other assets.

The plant, which employs 300 men and women and has 19,000 spindles, will continue to operate under the present management, with Don Maddox in charge as superintendent. Production of 20's and 50's combed yarn will continue without interruption. Built in 1921, the Gastonia mill is considered one of the leading combed yarn plants in the country. It was headed by D. M. Jones, one of the founders, until his death.

U. S. Rubber last month announced that plans are being made to triple its production of high-speed grinding wheels used by steel mills, foundries, and metal fabricating plants. Increased production facilities will be established in the new plant in Ft. Wayne, Ind., recently acquired from the government. J. A. Fairfield, manager of grinding wheel sales, said the company will increase the volume and variety of both rubber and synthetic resin bonded wheels.

U. S. Rubber has purchased the outstanding common stock of Dispersions Process, Inc., according to a statement issued September 24 by John P. Coe, vice president and general manager of Naugatuck Chemical division of the rubber company. Activities of the subsidiary, which consist of the development and sale of dispersions of rubber, reclaimed rubber, plastics, and other rubber-like materials, will be combined with the latex activities of Naugatuck Chemical division, Mr. Coe stated. Sales headquarters for dispersions and latex will be located at the Naugatuck, Conn., plants, where development and manufacture of chemicals, latex, and dispersions are centered.

Dispersions Process, Inc., is a Deleware corporation, organized in 1928. It controls many patents covering methods of producing aqueous dispersions.

Notes on Personnel

Three personnel appointments and the creation of a new distribution planning and business development position in the Gillette Tires division were announced last month by H. C. McDermott, Gillette sales manager.

Leonard E. Luse has been promoted to the newly created position, that of manager, distribution planning and business development. With the company since 1923, Mr. Luse has served in a number of capacities, including that of chief clerk and assistant office manager of the New York branch, territory salesman, and manager of sales service for the jobber tire sales division. His most recent assignment was manager of sales operations, Gillette division.

Frank W. Lewis was advanced to the post of merchandise manager, allied products. Mr. Lewis, who previously operated his own retail tire business and later served with the United States Treasury Department as an assistant personnel and office manager, recently was a field representative in Gillette's eastern division.

John T. Griffith has been promoted to manager, sales operations. For two years Mr. Griffith was assigned to the company's statistical analysis section. Since joining the Gillette division, he has handled the statistical details of the sales operations section.

Capt. A. A. Nichoson, World War veteran and assistant to the vice president,

New U. S. Royal Air Guard Inner Tube

The Texas Co., addressed the dinner meeting of the rubber company's annual safety conference, September 19, at the New York Athletic Club. His subject was "The What, the How and the Why of Safety." He was introduced by C. S. Ching, director of industrial and public relations, U. S. Rubber.

New Products Announced

A removable dust excluder boot for the landing gear struts of civilian planes has been developed by the rubber company to protect precision-ground cylinders and pistons from the harmful effects of abrasive substances. The boot is corrugated to provide a bellows-like action, permitting free movement of the pistons. The boot is split lengthwise and laced to permit quick removal for inspection or replacement. Made of high-strength fabric impregnated with oil-resistant synthetic rubber the new device has extremely light weight and is produced in a wide range of sizes. It can also be used to protect moving parts of mechanical equipment used on farms and in various mining and manufacturing industries.

Neolay, a new aircraft wire which reduces the fire hazard and lightens the weight of planes, has been announced by U. S. Rubber. The product is 30% lighter than conventional electrical wire and would save nearly 300 pounds if used in a plane the size of the B-29 Superfortress. The wire's flameproof insulation consists of a layer of glass fiber to insure circuit integrity, and a fire-resistant synthetic rubber layer applied by a special dipping process developed by the company. The overall diameter is 15% smaller than that of conventional aircraft wire. Recent tests show the wire to be highly resistant to oil, chemicals, mildew, and fungus. Company engineers expect the new wire to be of great aid to aircraft manufacturers seeking to increase pay load and range of planes by means of weight reduction.

Development of an automobile inner tube of waffle-like construction designed to prevent rapid deflation in the event of a puncture was announced by U. S. Rubber. The crown of the new tube is composed of a patchwork of square pockets which press against the inside of the tire as the tube is inflated. If the tube is punctured by a nail, this squeezing action crowds the rubber around the nail. Thus the tube loses air at a much slower rate, allowing the driver to proceed a greater distance before stopping for repairs. Made of Butyl, and known as the U. S. Royal Air Guard tube, it will be marketed at premium prices when OPA price approval is given.

An automobile tire which further develops the principle of increased air capacity at lower air pressure will be produced by U.S. Rubber as its first postwar premium tire. Known as the U.S. Royal Air Ride, the new tire has been on display by U.S. dealers. It will be marketed as a premium tire when government price regulations permit its release, reported W. D. Baldwin, sales manager of the company's U.S. Tires division. By combining 14% more air volume and 8% less air pressure than the standard U.S. Royal tire of the same size, the new tire gives greatly enhanced cushioning effect, Mr. Baldwin stated. Additional features include a flatter tread and sharply defined shoulders to aid in the dissipation of heat built up during tire flexing. Laboratory and road tests have re-

vealed that the tire runs 10 to 15 degrees cooler, thus affording greater protection against blowouts and increasing the tire's mileage.

The Air Ride tire utilizes the block-tread design, a basic U.S. Royal pattern, but the design has been adapted to meet the new requirements, such as the virtual elimination of tire noise and the improvement of the car's stopping power, Mr. Baldwin emphasized. The perforated brake-action tread has been reintroduced. When the car's brakes are applied, these perforations open up, helping to bring the vehicle to a sure, safe stop. The new tire will be of rayon construction in all sizes authorized by the government. It will be characterized by different size markings, such as "6S-16" instead of "6.50-16."

Television and movie audiences of 50 years hence may see a film of Detroit's Automotive Golden Jubilee of 1946, if the present plans of the Automobile Manufacturers Association are carried out in 1996. U. S. Rubber, which sponsored the televising of the Jubilee and later telecast it over a network of eastern stations, has presented a copy of the film to the AMA. After a number of showings this year the film will be sealed in the Association library with other automotive historical lore and shown again 50 years from now, the rubber company reported.

Westinghouse Electric Corp., Pittsburgh, Pa., has named D. E. Inman engineering manager of the district engineering and service department, to be located at the East Pittsburgh plant and to be responsible for the coordination of the consulting and application engineering and the product performance analysis activities of the engineering and service department. A graduate of the Colorado Agricultural College, Mr. Inman came to Westinghouse in 1925 with a B.S. degree in electrical engineering. After 10 years in the control engineering department he joined the Pittsburgh engineering division as a consulting and application engineer. In 1938 he was transferred to the Westinghouse Cleveland office and became engineering and service manager there in 1941, reliquishing that post to assume his new position. As a design engineer, Mr. Inman devoted much of his time to the development and design of special control equipment for motors such as those used in public buildings, municipal pumping stations, and in rubber and cement mills. In the consulting and application field he provided engineering service in many lines of activity, with special attention paid to the steel, rubber, and machine tool industries.

Technical Library Consultants, 347 Madison Ave., New York 17, N. Y., offers a library research service for industrial and scientific organizations, which is specifically designed to meet the literature research needs of executive, sales, and research departments. Specialists on the staff have been serving industry for years in the installation of complete special libraries, technical indexing of organization reports, and seeking the answer to research problems so far as the literature and patents in most European languages can supply it.

New U.S. Royal Air Ride Tire

War Assets Administration, Washington, D. C., among the surplus property recently offered for sale included: $1,500,000 worth of miscellaneous supplies including plastics and synthetic rubber, hydrocarbons, natural and synthetic fibers, organic compounds, dyestuffs and intermediates, gases, etc., cable; $750,000 worth of factory-maintenance materials including oils, waxes, paints, Butyl, plastic, chemicals, solvents, etc.; 1,600,000 pair of men's rubber half-soles.

Essex Rubber Co., Trenton, N. J., will celebrate its fortieth anniversary next year. The company was organized in 1907 by the late C. H. Oakley for the production of rubber soles and heels. Essex grew rapidly, and, although attention was centered in manufacturing for the shoe trade, many additional products came from the lines, including auto accessories and mechanical packings. During the war the company produced gas masks and operated two metals departments: one for the manufacture of ribs for the wings of Flying Fortresses, and the other for processing many vital parts with powdered metals. Throughout the years Essex has devoted itself chiefly to improving the quality of rubber heels and soles. In addition Essex has operated and continues to run a large reclaim plant.

Martin Toscan Bennett has opened an office at 917-15th St., N.W., Washington, D. C., for the practice of general industrial engineering. Mr. Bennett recently returned from his latest trip abroad where he was chief of staff of Ambassador Edwin W. Pauley's mission which surveyed industries in Japan, Korea, Manchuria, Germany, and Austria. An engineer with extensive experience in foreign work, Mr. Bennett served throughout the war as economic and technical consultant to several war agencies including War Production Board, Office of Economic Warfare, and Foreign Economic Administration.

The Flintkote Co., 30 Rockefeller Plaza, New York 20, N. Y., on September 5 reported that Lester Kirschbraun, vice president in charge of research, has resigned as an officer of the company and is moving to California, where he will be less active than formerly in research for Flintkote, but will, according to I. J. Harvey, Jr., president, "continue with the company, so that we expect to enjoy for many years the benefits of his valuable experience in the research and development of our increasingly broader lines of building materials, industrial products for maintenance and new construction, asphalt tile wall and floor coverings and paperboard products." Mr. Kirschbraun, in charge of Flintkote research since 1918, has more than 200 patents filed in his name.

Heyden Chemical Corp., 393 Seventh Ave., New York 1, N. Y., has opened a sales and business office at 1700 Walnut St., Philadelphia, Pa.

James Day, of James Day (Machinery), Ltd., Ford House, 88 Regent St., London, W.1, England, was scheduled September 14 to leave for a visit to the United States, to consult with the firm's principals: American Insulating Machinery Co., Industrial Oven Engineering Co., Mossberg Pressed Steel Corp., New England Butt Co., and John Royle & Sons.

Thermoid Co., Trenton, N. J., has made Max F. Zullig chief of the chemical section, research department. He had previously been with A. Maschmeyer, Jr., Inc., Newark, for 12 years.

PACIFIC COAST

Southern California Rubber Co. is the firm name under which W. A. Lorenz is conducting business at 1732 N. Alexandria Ave., Los Angeles, Calif.

Raymond B. Stringfield has been made president of the Fullerton Co. and is heading new management which is rebuilding the plant in Fullerton, Calif., that was partially destroyed by fire last spring. Production of oil field specialties and molded rubber products will be resumed this month. Mr. Stringfield served as manager of service laboratories at Akron and as chief chemist at Los Angeles for the Goodyear Tire & Rubber Co. from 1920 to 1928 and since that time has been consulting chemical engineer on rubber and plastic problems for many western industries. He is a graduate of the University of Southern California and of Massachusetts Institute of Technology, was organizer and first chairman of the Los Angeles Rubber Group, Inc., is a past chairman of the Southern California sections of both the American Chemical Society and the American Institute of Chemical Engineers, and is at present chairman of the Southern California District Committee of the American Society for Testing Materials.

TEN to FIFTY...

10% Better rebound
20% Better detrition
30% Better dynamometer
40% Better curing
50% Better aging

STATEX-B

is Better By

TEN to FIFTY!

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400 TONS OF SMOKE A DAY

COLUMBIAN CARBON CO. • BINNEY & SMITH CO.

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SEMI-REINFORCING

RUBBER CARBON

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• A COLUMBIAN COLLOID •

STATEX-93 *The carbon for heavy-duty reinforcement*

MICRONEX *For 30 years the standard reinforcing carbon*

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OHIO

Forms International Subsidiary

The Firestone International Co. has been organized under the corporate laws of Maine, according to Harvey S. Firestone, Jr., president of The Firestone Tire & Rubber Co., Akron, who stated that the growth of Firestone's business in countries outside the United States requires the expansion of its organization to direct Fires.one activities in all foreign countries. The new company will have charge of all Firestone plants outside of the United States and Canada as well as the responsibility for all foreign branches and distributers.

President of the new subsidiary is Samuel Broers, head of Firestone's export operations for the last 24 years.

John L. Cohill, who has supervised overseas operations in Argentina, South Africa, and India during his 20 years with the Firestone Export Co., predecessor of Firestone International, has been named vice president of the new organization.

George E. Porteck, also a veteran of many years service with Firestone Export, becomes export manager of the new subsidiary.

Harvey S. Firestone, Jr., was the principal speaker at the dinner September 20 at the Woldorf-Astoria Hotel, New York, celebrating commemoration in the United States of the one hundredth anniversary of the independence of the Republic of Liberia.

The Firestone Memorial Carillon, originally presented in 1943 to the Chaplains' Corps at Camp Patrick Henry, Newport News, Va., has been placed at its new permanent home, Fort Benning, Ga. The Carillon, a gift of Harvey S. Firestone, Jr., and "dedicated to the men and women of Firestone in the service of their country," was heard by tens of thousands of service men and women at the Newport News' Port of Embarkation during the war.

Air Springs for Pullman Cars

An experimental application of air springs to railroad passenger-car trucks, expected to lead to revolutionary changes in railroad passenger-car design and greatly increased passenger comfort, has been tested in Chicago by research engineers from Firestone and from the Pullman-Standard Car Mfg. Co. This innovation was given its first public tryout in a special run between Michigan City and Chicago. Used in the experiment was Pullman's special laboratory car, one end of which was equipped with Firestone air springs and the other with steel coil springs. Instruments capable of checking the slightest variation in lateral sway and vertical motion caused by track irregularities recorded the test, which was made at speeds varying from 35 to 80 miles per hour. A joint statement issued by Roy F. Johnson, Pullman research engineer, and Roy W. Brown, Firestone research engineer, noted that this trial run was the fourth testing of air springs in railway passenger cars and emphasized that the air spring is still in early stages of experimentation and that many test runs over a period of several months are necessary before a comparison of these springs with convential steel coil springs can be made.

The air spring has already been used on airplane landing gears, heavy truck trailers, passenger buses, and on Bofors anti-aircraft gun carriers. It has also been tested on numerous passenger autos and found to be superior to conventional steel suspension systems. The spring can be compared to an auto tire, about nine inches in diameter and four inches high, lying on its side. Inflated, it is connected to an air reservoir which acts as both spring and shock absorber. When the tire-like bellows is deflated by reason of a wheel hitting a track irregularity, the bellows forces air into the reservoir. The rebound is then snubbed by a specially designed control valve between the bellows and the reservoir, thus minimizing the shock to the car passengers.

Goodyear Personnel Changes

Appointment of Roland H. Gray and S. A. Steere as vice presidents of the Goodyear Clearwater Mills and the Goodyear Decatur Mills with plants at Cartersville, Rockmart, and Cedartown, Ga., and in Decatur, Ala., was announced last month by C. Slusser, vice president of the Goodyear Tire & Rubber Co., Akron.

Mr. Gray's duties will include business contacts for the four plants in the area as well as supervision over the accounting of each. Mr. Steere will continue in charge of operations of the mills.

Mr. Gray has been with Goodyear since November, 1933, when he was made assistant treasurer of the Goodyear Decatur Mills. From January, 1941 until April, 1946, he was resident manager of the Goodyear Engineering Corp., operator of Hoosier Ordnance Powder Bag Loading plant at Charlestown, Ind.

Mr. Steere, manager of Goodyear's cotton and fabric production departments, joined the company in 1919 as superintendent of the company's textile mills in California. Since 1922 he has been in charge of fabric production at the company's fabric mills. He directed the experimental work in fabric which resulted in the perfection of the company's Supertwist cord fabric for longer wearing tires.

Goodyear has appointed R. R. Bowman personnel manager for the northeast division, with headquarters in New York, succeeding L. C. Stevenson, whose new duties will be announced later. Mr. Bowman had served as veterans' service representative at the company's Akron factories since his return from the U. S. Army. He started with the company on the production squadron in July, 1933, transferring to the Syracuse, N. Y., store as a sales promotion clerk in December, 1934. For several years he served in several stores in New York State; then in September, 1939, he was assigned to special dealer sales in Buffalo and in November, 1939, was made truck tire salesman, Pittsburgh district, transferring later to general-line sales in that district. He left in November, 1942, to enter the Armed Forces, returning in September, 1945, as veterans' service representative.

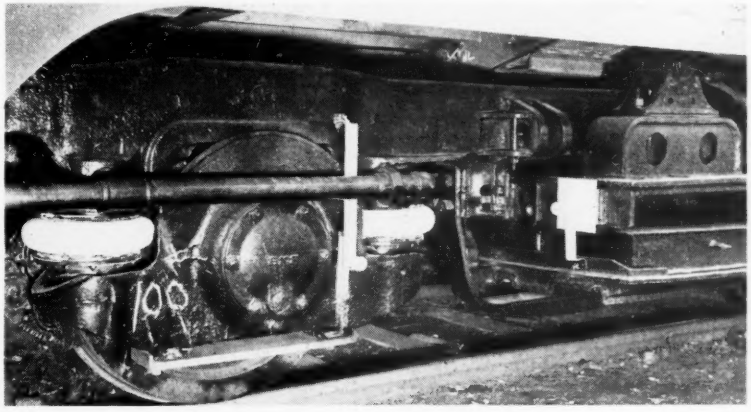
Al Werner, recently discharged from the army, succeeds Mr. Bowman. Before entering military service, Mr. Werner was in the office of the director of personnel. He joined Goodyear in 1939, shortly after graduation from the University of Nebraska. After serving on the squadron he worked four years in Plant Two efficiency department.

Goodyear, furthermore, has merged three departments in the mechanical goods division as an initial step in an accelerated postwar expansion program, according to W. C. Winings, mechanical goods division manager. E. W. Sanders, manager of printers' supplies and industrial rolls, will head the new tank lining and rubber-covered roll section into which the printers' supply department has been integrated. R. W. Eckstein, assistant manager of tank lining, becomes manager; while Ernest Peterson, assistant to Mr. Sanders, will assume new duties as manager of the industrial roll department.

Increased production facilities, including a substantial addition of new equipment, will be provided for the new setup, Mr. Winings added.

Mr. Sanders joined Goodyear in 1928 as a sales trainee and served in various districts as a Goodyear technical man until 1936 when he joined the Akron mechanical goods staff becoming assistant manager of printers' supplies in 1936 and succeeding the late R. M. Werner as manager.

Mr. Eckstein also came to Goodyear in 1928, rising through ranks from a general labor job. In 1937 he graduated from



View of Pullman Laboratory Car Showing White Tire-Like Firestone Air Springs Mounted on Either Side of the Journal Box Suspension. Vertical White Object between Springs Is Snub Valve, and White Square at Right Is Vertical Motion Recorder

the Goodyear production squadron, and shortly after was appointed to a secretarial position. He entered tank lining sales as a clerk in 1938 and was appointed assistant manager in January, 1946.

A veteran in the rubber industry, Mr. Peterson joined Goodyear in 1943 as a staff man in the printers' supplies and industrial rolls department.

Austin E. Hertzig, manager for Goodyear's Buffalo district since December, 1941, retired from active duty August 31. He is succeeded by Harold C. Bott, formerly assistant manager of the Boston district. Mr. Hertzig started as a salesman at Pittsburgh in April, 1911. His appointment as district manager there came January 1, 1920, a position he held until his assignment to Buffalo.

Mr. Bott joined Goodyear in July, 1929, in sole and heel advertising with headquarters in Pittsburgh. A year later he was transferred to special consumer sales. He has successively been substore manager at Columbus and manager of the Niagara Falls, N. Y., Erie, Pa., and Buffalo stores. In June, 1941, he was promoted to district store supervisor in the Buffalo division. Then he entered the Armed Forces in May, 1943. Upon his return to the company in February, 1946, he was named assistant manager in the Boston district.

Harry A. Walker has been made plant engineer at Goodyear's tire factory in Lecheria, Mexico, which plant, recently expanded, produces tires, tubes, and mechanical goods. Mr. Walker is a long-service member of the company's engineering staff. He had first joined Goodyear in 1917, but left to study mechanical engineering at Ohio State University and returned in 1921. During the recent war Mr. Walker was industrial engineer and safety manager at the Charlestown, Ind., powder bag loading plant, operated by Goodyear for the government. His latest assignment in Akron was in the power house division.

Goodyear recently sent out to Singapore two representatives—I. Taylor, managing director of Goodyear Orient Sales, in Singapore, and M. R. Shield, who is to represent Goodyear interests in Singapore and the Far East.

Jerome C. Hunsaker has been elected a director of the Goodyear company, succeeding Gen. R. E. Wood. Dr. Hunsaker is head of the departments of mechanical engineering and aeronautical engineering at Massachusetts Institute of Technology and is also chairman of the National Advisory Committee for Aeronautics and treasurer of the National Academy of Sciences. Dr. Hunsaker holds directorships in the McGraw-Hill Publishing Co., The Sperry Corp., and the Shell Union Oil Co. From 1928 to 1933 he was vice president of The Goodyear Zeppelin Corp., Akron.

H. D. McLendon, assistant district manager for Goodyear at Philadelphia, recently completed 25 years with the company, as did L. J. Holroyd, district manager in Des Moines.

Among those who recently completed three decades of service are: E. L. Caulfield, store manager, and P. N. Dexter, auto tire field representative, both in Boston; A. B. C. Hager, farm tire representative in Kansas City; B. W. Werr, district farm tire representative at Omaha; A. R. Ruplin, special petroleum representative in the northcentral district.

With 35 years now to his credit is Bernard E. Kelley, district manager at Syracuse.

J. E. Mayl, Goodyear Vice President, Inspects New 27.00-33 Earthmover Tire

Recent Goodyear Developments

The largest truck tire built in the 48-year history of the company, a 27.00-33 earthmover casing, is now in production at Goodyear. Weight of the new tire is 1,482 pounds, according to J. E. Mayl, Goodyear vice president, who announced that the huge casing has been added to the company's regular sales line. Overall weight of tire, tube, and rubber flap will total 1,627 pounds. The tire has 24 plies of heavy-gauge rayon and is designed to handle unusually heavy off-the-road hauling requirements. At 10 miles per hour, the tire has a load rating of 31,050 pounds at 40 pounds' inflation; at 25 miles per hour, the load rating is 27,600 pounds also at 40 pounds' inflation. The tire is being manufactured in two thread designs: All-Weather and Sure Grip. The All-Weather read is for both trailing and driving earthmoving operations; while the Sure Grip's primary purpose is to deliver super-traction for driving wheels. The tire fits a five-degree taper rim with sufficient compression under the bead to prevent slippage at low air pressure.

Something new, a self-peeling casing which retains the natural color and flavor of the product, has been added to liverwurst. It is another use for Pliofilm, the liquid and moisture-vapor proof packaging material produced by Goodyear. The casing, fabricated by the Naturalux Products Corp., Brooklyn, N. Y., is made by tensilizing the Pliofilm to get a circumferential rather than a longitudinal stretch. In use by Karl Seiler & Sons, Philadelphia, Pa., the raw product is stuffed into the Pliofilm casing and closed by tie strings on both end. The sausage is then dipped into hot water, causing the tensilized Pliofilm to contract around the meat. The sausage is then chilled and is ready for market. Use of Pliofilm, Naturalux company officials have found, reduces loss of weight, assures uniform taste, size, and capacity, retards spoilage and crusting, and gives the customer a negligible casing weight. In addition the Pliofilm casing virtually uncurls itself when the liverwurst is sliced.

A new high in comfort is promised sports writers and fans in New York's Yankee Stadium with installation of seats in press box, boxes, loges, and grandstand with Airfoam cushioning. The Airfoam, a foamed rubber product of Goodyear, is covered with simulated leather of "Yankee Red," a postwar plastic likewise produced by Goodyear.

A weight saving of almost 3,000 pounds, making it possible to carry a greatly increased fuel supply, was engineered into the B-29 *Pacusan* for its recent non-stop 10,000-mile flight from Oahu, H. I., to Cairo, Egypt, by Goodyear aeronautical engineers. The *Pacusan*, better known as the *Dreamboat*, which flew non-stop from Guam to Washington (8,198 miles), was equipped with 22 Goodyear bladder wing cells and four of the company's latest-type Pliocel tanks made of resin-treated nylon fabric. The Pliocels, with a total capacity of 1,440 gallons, were installed in the center section of the giant aircraft. Installation of the Goodyear lightweight tanks, according to J. A. Bernel, company engineer who supervised the installation, made it possible for the plane to carry two droppable fuel tanks in the bomb bay section. Mr. Bernel explained that Pliocels weigh about 0.07-pound per square foot, and the bladder-type tanks weigh about 0.33-pound per square foot, in comparison to the 0.50-pound per square foot weight of non-military metal tanks.

The nation's No. 1 football team, West Point, will come before the NBC television cameras in seven of its games this year under a contract recently announced by the network and Goodyear. Sponsorship of these games marks the entrance of Goodyear into television broadcasting. Overcoming many engineering obstacles, NBC's television station WNBT will utilize a special relay system to bring the pictures of the game from West Point to New York, N. Y. The new super-sensitive Image Orthicon cameras will be employed by NBC for all these games. Five of the games will be telecast from West Point, as follows: September 21, Villanova; September 28 Oklahoma; October 5, Cornell; October 19, Columbia; and November 2, West Virginia. Two games, that with Duke on October 26, and with Notre Dame on November 9, will be broadcast from New York.

Industrial Ovens, Inc., is the new name of Industrial Oven Engineering Co., according to C. A. Litzler, president. The company also formally announced its establishment in its new plant and offices at 13825 Triskett Rd. Cleveland, 11. The organization specializes in engineering, designing, and installing industrial heating and processing equipment, with particular accent on continuous operations in the handling of the materials to be treated.

The Timken Roller Bearing Co., Canton, made three executive changes in its steel and tube division. H. R. McLaren, formerly superintendent of tube mills, has been made assistant general superintendent and is succeeded by J. P. Wargo, assistant superintendent of tube mills and finishing departments; while R. R. Elsasser, until recently manager of the company's new-born Newton Falls, O., plant, becomes assistant superintendent of tube mills.

Leases Aircraft Brake and Wheel Plant

The B. F. Goodrich Co., Akron, is leasing a government building adjoining Waco Aircraft Co., Troy, O., it is announced by T. G. Graham, vice president. The modern plant, used for the manufacture of gliders during the war, will house the Goodrich aircraft brake and wheel manufacturing division.

Earlier this year the company purchased the airplane wheel and brake division of Hayes Industries, Inc., Jackson, Mich., and manufacturing operations will now be transferred from the Hayes plant to Troy.

In 1937 the company introduced a new-type airplane brake which until this year was manufactured under license by Hayes Industries. The Goodrich brake was used on every four-engined American bomber built during the war.

Recent Goodrich Appointments

Vice President J. J. Newman has reported the establishment of a new department, field sales personnel administration, with Dale Kramer as director of field sales personnel. Mr. Kramer, former personnel manager for the eastern division, will report to Guy Gundaker, Jr., field sales manager, replacement tire sales division.

The new department is responsible for administration of field sales personnel matters for all Akron sales divisions and will function in a line relation to the replacement tire sales division, and in a staff service relation to other sales divisions.

Mr. Kramer started with the company as a clerk in sales personnel in Akron in August, 1933. He later was named operations manager, field personnel. He spent three years in the Armed Forces.

L. W. Siegel will work with Mr. Kramer as operating manager, field sales personnel. Mr. Siegel served in credit, office, and operating managerial capacities in the Pittsburgh and Buffalo districts before being transferred to Akron. His most recent position was that of operating manager for office and field personnel.

D. D. Reichow, manager of industrial relations at Goodrich since 1941, has been named assistant to the vice president—employe relations, according to Vice President J. W. Keener. Mr. Reichow, with the company since 1925, joined its tire division directly from the University of Iowa, later being graduated from the University of Akron. He was manager of scheduling, assistant staff superintendent of the tire division, and then division staff superintendent (1929). In 1935 he became director of the companys' employe training program in Akron and in 1937 was transferred to the industrial relations department.

Following the recent establishment of shoe product sales as a separate division of the Goodrich company, Fred A. Lang, division general manager, announced the following appointments: L. E. Rohrbaugh has been named manager of sales to shoe manufacturers; J. H. Stackhouse, manager of sales to the shoe repair trade, and W. C. Orme, division operations manager.

Mr. Rohrbaugh, with the company since 1926, had been manager of shoe product sales since 1943. His duties in that post had been about the same as they will be under the new division setup.

Mr. Stackhouse has been in the heel and sole branch of the rubber industry since 1918, mos. of that time in sales. He had been with the Hood Rubber Co. division of B. F. Goodrich since 1926 and had been sales manager of its findings division since 1936.

Mr. Orme, with the Hood organization since 1927, for the last several years had been sales service manager.

Clyde O. DeLong has been named merchandise manager of Goodrich's industrial products sales division, succeeding Fred A. Lang, recently appointed general manager of the new shoe products sales division. Mr. DeLong, with the company since 1928, had been manager of sundries sales for the last three years. He had previously been operating manager of the industrial products sales division, as well as handling various sales positions. He is a graduate of Miami University.

Mr. DeLong last month also was presented the Meritorious Civilian Service Award by James Forrestal, Secretary of the Navy, for services on the staff of the Navy rubber survey and as consultant to the Navy rubber director. Mr. DeLong was cited particularly for his contribution to conservation of natural rubber during the period of shortage and for a plan of control of rubber products inventory by the Navy.

J. R. Thompson has been named Denver, Colo., district manager, industrial products sales division, to succeed John Gulledge, acting district manager in Denver, now assigned other duties in the division. Mr. Thompson, a major in the U. S. Ordnance Department for four years, is a graduate of Georgia Tech. His first position with Goodrich, in 1930, was at Martha Mills, Silvertown, Ga., where, as a member of the technical department, he engaged in experimental textile engineering. He joined the industrial products sales division in 1933, covering textile mills in the Southeast, with headquarters in Atlanta.

C. H. Hedenberg has been named operations manager of Goodrich Svenska Gummi, Aktiebolag, Stockholm, Sweden, subsidiary of the International B. F. Goodrich Co., according to S. W. Caywood, president. Mr. Hedenberg has had 12 years experience in the rubber industry in Sweden.

Lester T. Sharp

Interstate Latex Co., Youngstown, has placed on the market a new-type air-conditioned pillow made from shredded foam rubber and said to be ideal for people suffering from allergies. Making use of Airfoam, a product of the Goodyear Tire & Rubber Co., the latex company claims its product is odorless and dustless, verminproof, and by the very nature of its construction resistant to lumping or shifting of the material. Named SlumberAir, the pillow is said to be excellent for hotels, hospitals, and dormitories, as well as the private home, and is marketed in standard and twin-bed sizes. The secret of the SlumberAir, according to Charles Endres, secretary and general manager of the latex company, is the patented pocketing of the shredded latex within the ticking. Scientific shredding of the foamed latex increases the number of air cells and assures even porosity throughout. The company also plans production of other types of latex products, including toys, seating, furniture cushions, etc.

Pharis Tire & Rubber Co., Newark, and CIO Local 21, URWA, sponsored the first postwar picnic for the company's employes and their families, which was attended by about 6,000 persons. The day's program included athletic contests, games, dancing, skating, and free admission to all the concessions in Ye Olde Mill Park. Highlight of the affair was the awarding of 700 pins to employes who had marked five, 10, 15, 20, 25, and 30 years with the company. Among those in the three-decade group was Carl Pharis, founder of the company and now chairman of the board, who spoke briefly. Presentation of the pins was made by the Pharis president, Furber Marshall.

William H. Mason has resigned as public relations director for The General Tire & Rubber Co., Akron, to open advertising and public relations offices in Mexico City. During the recent presidential campaign in Mexico, Mr. Mason served as Miguel Aleman's public relations adviser in the United States. Under the firm name of Abanil, S. A., Mr. Mason will promote Mexican travel, Mexican products, and intercountry business cooperation. The firm has established temporary headquarters in Hotel Reforma, Mexico City. An affiliate firm, Mason, Inc., will open New York offices.

Sharp Joins Akron Standard

The appointment of Lester T. Sharp to the sales staff of The Akron Standard Mold Co., Akron, was announced last month by Ward W. Sigler, vice president and sales manager. Mr. Sharp was previously associated with The Firestone Tire & Rubber Co. in the engineering department and has a thorough knowledge of the latest rubber processing methods and machinery as used in the industry. Prior to joining Firestone he had been with the Perfection Stove Co. as production manager.

Mr. Sharp comes from Peoria, Ill., and was graduated from the University of Illinois in 1936, where he obtained a B.S. degree in mechanical engineering. He is also a member of The Ohio Society of Professional Engineers.

MIDWEST

Monsanto Appointments

John L. Gillis, vice president of Johnson & Johnson International, New Brunswick, N. J., rejoined Monsanto Chemical Co., St Louis, Mo., on October 1, to assume duties to be assigned by the executive committee. Mr. Gillis had been formerly connected with the Monsanto foreign department as general export manager and assistant director of the department, but left in June, 1944, to go with Johnson & Johnson. He first came to Monsanto upon his graduation from Washington University in 1933.

Edmund D. Kennedy has been made sales promotion manager of Monsanto's plastics division, Springfield, Mass., according to F. A. Abbiati, general sales manager. Mr. Kennedy will have general supervision over sales promotion activities of the division and will report to Mr. Abbiati and to James R. Turnbull, assistant general sales manager. Mr. Kennedy has had about 20 years experience in advertising, sales promotion, and related fields. A native of Pittsburgh, he was educated at Carnegie Institute of Technology and at the University of Pittsburgh.

Also from the plastics division came news of the appointment of C. K. Bump and H. W. Mohrman as assistant directors of research. Dr. Bump will have charge of general application and technical service sections; while Mr. Mohrman will head the physics and physical testing sections. The two men were formerly research group leaders.

Dr. Bump received his academic degree at Amherst College and his doctorate in physical chemistry at Cornell University. He entered the Springfield plant as a research chemist in 1937.

Mr. Mohrman, a graduate of the University of Illinois, joined Monsanto in 1939.

N. N. T. Samaras, research director of the division, also announced the appointment of Harold F. Park as senior chemist.

The appointment of Simon Freed, former assistant chemistry professor at the University of Chicago, as a chief chemist at the Monsanto Clinton Laboratories, Oak Ridge, Tenn., was announced September 6 by Eugene P. Wigner, research director of the laboratories. The laboratories are operated by Monsanto Chemical Co. under contract with the Manhattan District as a research center in connection with the Oak Ridge Atomic energy development program.

James C. Kiper, former director of the community relations section of the Monsanto company, St. Louis, has joined James W. Irwin & Associates, New York and Chicago, as a group executive, with headquarters in New York.

The Cincinnati Rubber Mfg. Co., Franklin Ave., Norwood Station, Cincinnati 12, O., has moved its Chicago branch office from 43 E. Ohio St. to 325 W. Huron St., Chicago 10, Ill. The change was made to provide larger quarters to accommodate a more extensive stock of belting, hose, packing, and other mechanical rubber goods. K. E. Kersten is manager of the Chicago branch.

NEW ENGLAND

Newth Rubber Co., manufacturer of household goods, tire repair materials, and miscellaneous specialties, Barrington, R. I., destroyed by fire last November 25, opened for partial operation September 10, according to Frank F. Newth, the owner, who said he expects to employ 60 men at the plant, after assembling work started within two weeks. Approximately 25 men are to be employed under partial operation of the three rubber mills and presses in the plant. Some of the interior painting, installation of lighting fixtures, plumbing, and floor cementing is yet to be finished. The new building, constructed of cinder blocks and steel to replace the old wooden structure that was destroyed, will cover approximately 25,000 square feet.

Athol Mfg. Co., a pioneer in the coated fabrics field, Athol, Mass., has appointed Fred E. Wilcock assistant treasurer and Robert M. Taylor assistant sales manager of the company. Mr. Wilcock came to Athol Mfg. Co. in 1927; While Mr. Taylor joined its sales department after being graduated from Dartmouth College in 1936. He also served in the United States Army for more than four years.

Bradley Dewey, president of Dewey & Almy Chemical Co., Cambridge, Mass., and of the American Chemical Society, on a visit to New Zealand between atom bomb tests at Bikini, stated that prewar experiments in packing meat for export in thin rubber containers will be resumed as soon as rubber stocks are available. These containers, Mr. Dewey explained, were designed to prevent drying out, and New Zealand meat products packed in them reached America in excellent condition.

CANADA

The Canadian Department of Trade and Commerce, Ottawa, Ont., made public September 21 a list of 34 additional Canadian products which now may be exported in limited quantities to the United Kingdom under the token shipment plan inaugurated by Britain earlier this year. These products include: rubber bathing caps, hot water bottles, rubber bands, and erasers. Nine of the 34 commodities, including hot water bottles and erasers, remain subject to British price control or other restrictions applicable to similar goods produced in the United Kingdom.

City Council of Kitchener, Ont., on September 3 unamimously adopted a motion asking that the Dominion Government seek to bring an end to the walkout of approximately 15,000 CIO Ontario rubber workers which began June 23.

Discusses Synthetic Rubber

E. R. Rowzee, director of research of Polymer Corp., Ltd., Sarnia, Ont., recently addressed the Kiwanis Club of Windsor, Ont., on the growth and future prospects of the Canadian synthetic rubber industry. After exhibiting a motion picture showing how the Sarnia plant came into being, Mr. Rowzee stated that not even those who conceived the project would have dared to predict that in the Summer of 1946, a year after the end of the war, the demand for Polymer products would be at its greatest peak and the production of the plant would have reached an all-time high. They would not have believed it possible that Polymer would be turning out synthetic rubber at the rate of 115,000,000 pounds a year, or 35% above its designated capacity.

The people at Sarnia believe their company will continue to be one of their nation's major industries, Mr. Rowzee stated, not only because the plant has been, and will remain, one of the national defense setup, but because they believe in synthetic rubber and in the ability of Polymer to become the hub of a plastics and chemical industry in Canada.

Speaking of GR-S synthetic rubber tires, the Polymer executive declared that they are at least equal to, and often better than, prewar natural rubber tires on automobiles. As for truck tires, a test is now in progress at the San Antonio, Tex., United States Government proving grounds to determine the wearing qualities of synthetic truck tires of popular sizes. Fourteen weeks ago, said the speaker, a number of trucks were started on the road equipped with 11.00 by 20 all-synthetic tires. The trucks were 40% overloaded and driven partly on pavement and partly on gravel. Despite these conditions most, if not all, of the trucks were still on the road on August 1 after having traveled 36,000 miles, and some of the trucks are still going strong.

Mr. Rowzee then passed on to other applications of GR-S, such as in footwear, hose, and belting and applications of neoprene and Butyl rubbers where marked superiority to natural rubber has been shown. Discussing the research programs in effect both in Canada and in the United States, Mr. Rowzee declared, "It may be no exaggeration to predict that some day there won't be anything made of rubber that cannot be made better with synthetic rubber."

Speaking of his belief in the ability of Polymer to become the hub of a plastics and chemical industry, Mr. Rowzee stated that the first steps in this direction have already been taken with the contracts to sell a total of 12,000,000 pounds a year of styrene to Dow Chemical of Canada, Ltd., and Monsanto (Canada) Ltd., both of which companies are erecting new plants, the former in Sarnia and the latter near Montreal. Other industrial developments are being seriously considered at Polymer.

"We at Polymer are proud of what we have accomplished in the past four years and are optimistic about the future," said Mr. Rowzee. "We are selling more than $20,000,000 worth of synthetic rubber each year, and out of our gross rev-

enue we are paying all our costs, setting aside reserves for depreciation, and still showing a fair profit."

Calco Chemical Division, North American Cyanamid, Ltd., has been formed to distribute a complete line of dyestuffs, chemicals, and intermediates to the textile, leather, paper, and plastic industries. This division, which will also handle bulk medicinal chemicals for the pharmaceutical trade, textile resin finishes, and pigments, will maintain sales offices and warehouses at Victoria Ave. at Bute St., St. Lambert, Montreal, the main office, and at Royal Bank Bldg., Toronto 1. Laboratories and technical service facilities have also been established. W. H. Kieffer, manager of the new division, states that ample warehouse facilities will enable the company to carry extensive stocks.

Polymer Corp., Sarnia, Ont., is to provide butane this winter to United Gas & Fuel Co., Hamilton, Ont., as part of a plan to counteract a serious natural gas shortage in southwestern Ontario. The decision came at a recent meeting in Toronto of certain Ontario government officials and industrialists. Under the plan liquid propane originally contracted for by the Hamilton gas plant was diverted by provincial government sanction to the Dominion Natural Gas Co. to bolster the latter's waning natural gas reserves. For replacement, United is to obtain butane from the government-owned synthetic rubber plant in Sarnia.

Further construction also is intended at the Polymer plant, including an extension to the Butyl rubber storage building, 85 by 70 feet; a maintenance shop for the Canadian Synthetic Rubber Co., 40 by 232 feet; and extensions to the Dow Chemical storehouse, No. 1 yard office and I.P.S. control room. Construction is expected to be completed by the end of the year.

Dividends Declared

Company	Stock	Rate	Payable	Stock of Record
Denman Tire & Rubber Co.	Com.	$0.10	Oct. 1	Sept. 20
Denman Tire & Rubber Co.	Pfd.	0.125	Oct. 1	Sept. 20
Endicott Johnson Corp.	Com.	0.15	Oct. 1	Sept. 23
Faultless Rubber Co.	Com.	0.50	Oct. 1	Sept. 16
Firestone Tire & Rubber Co.	Com.	1.00 incr.	Oct. 21	Oct. 5
Garlock Packing Co.	Com.	0.25 q.	Sept. 30	Sept. 20
General Cable Co.	Pfd.	1.00 q.	Oct. 1	Sept. 26
General Cable Co.	2nd Pfd.	0.50 q.	Oct. 1	Sept. 26
General Electric Co.	Com.	0.40	Sept. 25	Sept. 20
General Tire & Rubber Co.	4¼% Pfd.	1.06¼ q.	Sept. 30	Sept. 20
General Tire & Rubber Co.	3¾% Pfd.	0.93¾ q.	Sept. 30	Sept. 20
General Tire & Rubber Co.	3¼% Pfd.	0.81¼ q.	Sept. 30	Sept. 20
B. F. Goodrich Co.	Com.	1.00 incr.	Sept. 30	Sept. 13
B. F. Goodrich Co.	Pfd.	1.25 q.	Sept. 30	Sept. 13
Goodyear Tire & Rubber Co. of Canada, Ltd.	Pfd.	0.50 init. q.	Oct. 31	Oct. 1
Goodyear Tire & Rubber Co. of Canada, Ltd.	Com.	1.00 q.	Oct. 1	Sept. 3
Jenkins Bros.	Non-Voting	0.25 q.	Sept. 27	Sept. 13
Jenkins Bros.	Fdrs. Shrs.	1.00 q.	Sept. 27	Sept. 13
Jenkins Bros.	7% Pfd.	1.75 q.	Sept. 27	Sept. 13
I. B. Kleinert Rubber Co.	Com.	0.25	Sept. 12	Aug. 30
Minnesota Mining & Mfg. Co.	Com.	0.35 incr.	Sept. 12	Aug. 24
Mohawk Rubber Co.	Com.	0.50	Oct. 15	Sept. 30
Mohawk Rubber Co.	Com.	0.50 extra	Oct. 15	Sept. 25
O'Sullivan Rubber Co., Inc.	Com.	0.10	Oct. 1	Sept. 20
O'Sullivan Rubber Co., Inc.	Pfd.	1.25 q.	Oct. 1	Sept. 20
Pharis Tire & Rubber Co.	Com.	0.15 init.	Oct. 10	Oct. 1
Raybestos-Manhattan, Inc.	Com.	0.37½ q.	Sept. 12	Aug. 29
Rome Cable Corp.	Pfd.	0.26⅔	Oct. 1	Sept. 12
Rome Cable Corp.	Com.	0.25 incr.	Sept. 28	Sept. 12
Seiberling Rubber Co.	Com.	0.25	Oct. 1	Sept. 14
Seiberling Rubber Co.	4½% Pfd.	1.13	Oct. 1	Sept. 14
Seiberling Rubber Co.	Pfd. "A"	1.25	Oct. 1	Sept. 14
United Elastic Corp.	Com.	0.75 irr.	Sept. 10	Aug. 20

FINANCIAL

Baldwin Rubber Co., Pontiac, Mich. Year ended June 30, 1946: net income, $294,977, equal to 94¢ a share, against $493,868, or $1.57 a share in the preceding fiscal year.

Faultless Rubber Co., Ashland, O. Year ended June 30, 1946: net income, $282,000, against $116,392, in the preceding fiscal year.

Garlock Packing Co., Palmyra, N. Y. First half, 1946: net income, $279,848, equal to 67¢ each on 418,500 shares, compared with $463,423, or $1.11 a share, in the corresponding period last year.

General Tire & Rubber Co., Akron, O., and subsidiaries. Six months ended May 31, 1946: net income, $3,237,830.55, equal to $5.19 a common share contrasted with $1,211,801.05, or $1.77 a share, for the 1945 period; net sales, $48,071,661.95, against $44,189,565.94; provision for taxes, $3,051,000, against $3,300,000.

B. F. Goodrich Co., Akron, O. First six months, 1946: net income, $12,470,390, equal to $8.74 a common share, contrasted with $5,621,544, or $3.52 a share, in the 1945 half; reserve for contingencies, $3,000,000, against $1,500,000; provision for taxes, $11,231,000, against $32,099,000; consolidated net sales, $163,857,141, against $222,530,675; current assets, $138,723,712, against $120,970,476; current liabilities, $28,701,747, against $27,772,928.

Raybestos-Manhattan, Inc., Passaic, N. J., and domestic subsidiaries. First half: net income, $649,736, equal to $1.03 a share, against $666,422, or $1.06 a share, a year earlier.

Johnson & Johnson, New Brunswick, N. J., and susidiaries. First half: net income, $2,904,000 equal to $3.05 each on the 896,925 common shares outstanding, contrasted with $1,816,516, or $1.86 each on 891,390 common shares, in the period ended June 30, 1945; provision for taxes, $2,166,000, against $3,240,966.

Minnesota Mining & Mfg. Co., St. Paul, Minn., and subsidiaries. First half: net income, $3,697,006, or $1.89 each on 1,951,530 capital shares.

National Automotive Fibers, Inc., Detroit, Mich., and wholly owned subsidiary. Six months to June 30: net profit, $407,055, equal to 43¢ each on 953,779 common shares, against $474,814, or 69¢ each on 601,384 shares, in the 1945 period.

O'Sullivan Rubber Corp., Winchester, Va. First half, 1946: net income, $121,779, against $238,371 in the '45 period; net sales, $2,488,915, against $3,304,641.

Phelps Dodge Corp., New York, N. Y. First half, 1946: consolidated net loss, $544,043, compared with net income of $5,156,275, or $1.02 a capital share, in the like period last year; sales, $20,755,419, against $78,783,503.

Seiberling Rubber Co., Akron, O. Six months to June 30: net income, $615,873, equal to $1.73 a share, against $300,445, or 84¢ a share, in the 1945 period.

Skelly Oil Co., Kansas City, Mo. First half, 1946: net income, $3,469,197, equal to $3.53 a share, against $3,269,727, or $3.33 a share, in the initial half of the preceding year.

Standard Oil Co. (Indiana), Chicago, Ill., and subsidiaries. First half: net earnings, $35,089,551, equal to $2.30 a share, against $27,609,156, or $1.81 a share, in the same months last year.

Thermoid Co., Trenton, N. J., and subsidiaries. First six months, 1946: net profit, $205,234, equal to 23¢ each on 602,464 common shares, against $501,048, or 74¢ each on 600,000 shares, a year ago.

United Carbon Co., Charleston, W. Va. Six months: net income, $1,369,671, equal to $3.44 each on 397,885 shares, compared with $922,812, or $2.32 a share, last year.

S. S. White Dental Mfg. Co., Philadelphia, Pa., and subsidiaries. June half: net profit, $686,973, equal to $2.29 each on 298,778 capital shares, compared with $371,848, or $1.25 each on 298,618 shares, in the 1945 half; taxes, $633,376, against $1,026,367; net sales, $9,911,576, against $8,748,289.

(*Continued on page* 103)

Patents and Trade Marks

APPLICATION

United States

2,403,607. **V-Belt Including Chain Links, Each of Which Carries a Block of Yieldable Friction Material.** H. Ogard, assignor to Armstrong-Bray & Co., both of Chicago, Ill.

2,403,617. **Belt Including a Body of Reinforcing Material Completely Covered with Rubber-Like Material Designed so as to Provide Increased Corner Edge Thickness.** F. G. Skeyhan, Akron, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,403,632. **Crutch Tip with a Cup-Shaped Washer Fitted with a Resilient Tip or Pad.** L. L. Brown, Harlingen, Tex.

2,403,657. **Electrical Insulating and Dielectric Medium Consisting of Polystyrene through Which Is Distributed Finely Divided Metal from the Group of Copper and Silver.** R. L. Harvey, Princeton, N. J., assignor to Radio Corp. of America, a corporation of Del.

2,403,687. **Seal for Bearings Including a Yieldable Sealing Ring.** J. E. Shafer, Chicago, Ill.

2,403,693. **Electrical Cable Which Will Float on Water and Includes a Central Flexible Core about Which Is a Gas Impermeable Rubber Skin, an Annular Flexible Conductor about the Skin, and an Insulating and Water-Excluding Covering Surrounding the Conductor.** J. Urmston, Montclair, N. J., assignor to Callender's Cable & Construction Co., Ltd., London, England.

2,403,749. **Flexible Non-Self-Supporting Fuel-Containing Cell Mounted in Aircraft and a Vent Mounted on the External Surface of the Aircraft.** W. B. O'Neal, Ellicott City, assignor to Glenn L. Martin Co., Middle River, Md.

2,403,801. **Valve for Inflating Balloons.** L. W. Isom, Belmont, and E. E. Habib, Arlington, assignors to Dewey & Almy Chemical Co., North Cambridge, all in Mass.

2,403,812. **Anti-Skid Tread.** C. R. MacCallum, Glasgow, Scotland.

2,403,836. **Self-Sealing Gasoline Tank.** H. P. Wagner, Atlanta, Ga.

2,403,951. **Variable Resistor Including in Combination a Plastic Member Formed of Material Subject to Plastic Deformation and Electrical Impedance Means Secured to the Member.** A. C. Ruge, Cambridge, Mass., assignor to Baldwin Locomotive Works, a corporation of Pa.

2,403,981. **Self-Contained Breathing Apparatus.** C. B. Jackson, Forest Hills, J. H. Schneider, Ross Huntingdon Township, and W. P. Yant, assignors to Mine Safety Appliances Co., both of Pittsburgh, all in Pa.

2,403,980. **In a Compressional Wave Radiator Including a Water-Tight Container, Filtering Means Including Mechanical Filter Units, Each of Which Includes Two Diaphragms Rigidly Supported at Their Peripheries and an Interposed Layer of Elastic Material Having a Comparatively Low Young's Modulus.** W. P. Mason, West Orange, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

2,403,991. **Breathing Apparatus.** C. J. Murphy and W. P. Yant, assignors to Mine Safety Appliances Co., all of Pittsburgh, Pa.

2,403,992. **Hair Curler of Thermoplastic Material.** A. A. Novin, assignor to Gaylord Products, Inc., both of Chicago, Ill.

2,404,002. **A Pressure-Applying Aviator's Suit for Use at High Elevations.** J. D. Akerman, Minneapolis, Minn.

2,404,063. **Fountain Pen.** E. Healy, assignor to Parker Pen Co., both of Janesville, Wis.

2,404,068. **Milking Means in a Milking Machine.** R. L. Hinman, deceased, Oneida Valley National Bank, executor, assignor to Hinman Milking Machine Co., Inc., Oneida, N. Y.

2,404,115. **Non-Metallic Resilient Elements in an Axle Generator Drive.** A. O. Williams, Battle Creek, assignor to Clark Equipment Co., Buchanan, both in Mich.

2,404,126. **Aluminum Battery Container with a Coating on the Inner Surface, Which Includes a Prime Coat of a Chlorinated Rubber Base Resin Paint, an Enamel Coat Including Silica Bonded to the Prime Coat, and a Seal Coat of a Copolymer of Vinyl Chloride and Vinyl Acetate.** J. C. Duddy, assignor to Electric Storage Battery Co., both of Philadelphia, Pa.

2,404,158. **Retainer for a Cylindrical Element Battery Electrode Including a One-Piece Tube of Resilient Insulating Material.** C. Armbruster, Roslyn, assignor to Electric Storage Battery Co., Philadelphia, both in Pa.

2,404,191. **Dielectric Heating Electrode Having a Composite Facing Consisting of an Inner Layer of High-Loss, Inorganic, Insulating Material with an Open Fibrous Structure and an Outer Layer of High-Loss, Heat-Stable, Insulating Material Having a Non-Fibrous Structure.** J. C. Quayle, Helsby, and P. Jones, Kelsall, assignors to British Insulated Cables, Ltd., Prescot, all in England.

2,404,225. **Apron of Rubber-Like Material Loaded with Heavy Material Opaque to X-Rays.** S. T. Green, Brooklyn, assignor to Picker X-Ray Corp., New York, both in N. Y.

2,404,239. **Buoyant Electric Cable Including a Number of Inflated Hollow Rubber Bodies for Dividing the Interior of the Cable into a Plurality of Compartments.** H. A. Macdonald, Gravesend, assignor to W. T. Henley's Telegraph Works Co., Ltd., Dorking, England.

2,404,384. **Self-Supporting Pessary.** Y. K. Kurkjian, Clifton, N. J.

2,404,409. **In a Container, a Closure Member Provided with a Groove Carrying a Wedge-Shaped Resilient Sealing Ring.** T. R. Smith, assignor to Maytag Co., both of Newton, Iowa.

2,404,410. **Bottle Cap Having a V-Shaped Recess in Which Is Arranged a Wedge-Shaped Resilient Sealing Ring.** T. R. Smith, assignor to Maytag Co., both of Newton, Iowa.

2,404,418. **Double-Walled Tank for Supplying Fuel to an Engine; the Tank Has a Highly Flexible Outer Casing and an Inner Flexible Self-Sealing Casing.** B. Walker, Piedmont, Calif.

2,404,422. **For Holding Food and Other Products Yielding Moisture Tending to Condense Within It, a Container Made of Impervious Transparent Sheet Material Containing an Ester of Cellulose.** B. Anderson, Maplewood, N. J., assignor to Celanese Corp. of America, a corporation of Del.

2,404,473. **In a Clip for Supporting Wires or a Conduit, a Strip of Flexible Cushioning Material Forming a Loop to Embrace and Support Wires.** C. J. Chunn, Sierra Madre, assignor to Adel Precision Products Corp., Burbank, both in Calif.

2,404,477. **Toy Including a Resilient Rubber Cup Simulating an Animated Legged Creature.** R. P. Ellis, York, Pa.

2,404,488. **In an Amphibian Propulsion Mechanism, an Endless Traction Belt and an Endless Series of Grousers, Each of Which Includes a Body of Rubber and Attaching Means for Securing the Grousers to the Belt.** J. M. Hait, San Gabriel, assignor to Food Machinery Corp., San Jose, both in Calif.

2,404,490. **In an Amphibian Propulsion Mechanism, an Endless Traction Belt with Tread on the Traction Surface, and an Endless Series of Impeller Blades Arranged along One Side of the Belt; Each of These Blades Includes a Metal Skeleton and a Body of Rubber Bonded thereto.** J. M. Hait, San Gabriel, assignor to Food Machinery Corp., San Jose, both in Calif.

2,404,494. **Rotary Seal.** E. G. Halby and R. J. Bushong, assignors to Marion Steam Shovel Co., all of Marion, O.

2,404,567. **Inflatable Suit Including a Headpiece and a Torso Portion.** R. S. Colley, Kent, O., assignor to B. F. Goodrich Co., New York, N. Y.

2,404,578. **Multiple-Chamber Fluid Container.** J. W. Liska, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,404,579. **Pneumatic Tire Including a Tread Portion Formed with a Plurality of Traction Elements.** W. S. Coben, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,404,580. **Tool Including a Coil Element and a Sheath of Flexible Elastic Material Covering the Coil Element and Adjacent Portions of Shank and Head and Permanently Bonded thereto.** Z. C. Van Schwartz, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,404,581. **Resilient Wheel.** C. E. Workman, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,404,594. **Buoyant Cell-Tight Hard Cellular Rubber Member Having Tubular Openings, a Hard Rubber Skin Covering the Buoyant Member and Lining the Openings, and Forming Reinforcing Means Adapting the Whole to Withstand Submarine Pressures.** H. Pfleumer, New Brunswick, N. J., assignor to Rubatex Products, Inc., New York, N. Y.

2,404,610. **Oil Seal with an Elastic Resilient and Massive Rubber Washer.** H. C. Abell, Interlaken, N. J.

2,404,729. **Inflated Water Toy.** V. H. Hurt, Cranston, R. I., assignor to United States Rubber Co., New York, N. Y.

2,404,736. **Electrically Heated Cover to Enclose a Machine Gun.** L. Marick, Grosse Pointe Farms, Mich., assignor to United States Rubber Co., New York, N. Y.

2,404,758. **Laminated Porous Elastic Fabric.** M. C. Teague, Ridgewood, N. J., and P. L. Mahoney, Jackson Heights, assignors to United States Rubber Co., New York, both in N. Y.

2,404,766. **Fuel Tank Made up of an Outer Ply of Steer Hide, a Ply of Unvulcanized Rubber Deposited from Latex, a Ply of Fine-Grained Sponge Rubber, a Second Ply of Unvulcanized Rubber Deposited from Latex, One Inner Ply of Polymerized 2 Chloro-1,3 Butadiene, and a Protective Film of Acrylic Resin on the Exposed Surface of the Inner Ply.** E. E. Hanson, Akron, and C. R. Park, Silver Lake Village, assignors to Firestone Tire & Rubber Co., Akron, both in O.

2,404,786. **Underwater Wave Translating Device Including a Hollow Container, a Wave Translating Unit, and a Submersible Hollow Chamber Having an Elastic Wall Pervious to Water.** L. G. Bostwick, Chatham, N. J., assignor to Bell Telephone Laboratories, Inc., New York, N. Y.

2,404,816. **In a Seal Assembly, Relatively Movable Parts in Sealing Engagement; One of the Parts Is Deformable.** J. R. Snyder, assignor to Thompson Products, Inc., both of Cleveland, O.

2,404,890. **In a Compressor Including a Driving Shaft Having an Excenter Section, a First Rigid Tubular Element around the Excenter, and a Second Rigid Tubular Element Concentric to the Driving Shaft, a Rubber Mass between the Tubular Elements and Bonded to the Contacted Walls, and Cavities in the Rubber Mass Forming a Spiral Path for Fluid to Be Pumped.** P. Schlumbohm, New York, N. Y.

2,404,947. **Toy Top with Compressible Portions.** R. P. Cordon, New York, N. Y.

2,404,972. **Flexible Diaphragms in a Freezing Tray Having Pneumatic Cube Release.** L. L. Mallard, Norfolk, Va.

2,404,973. **In an Ice Tray, Wall Structure with Deformable Bottom Wall.** L. L. Mallard, assignor of one-half to H. C. Hofheimer, II, both of Norfolk, Va.

2,405,038. **Aircraft Carburetor Diaphragm Including a Nylon Fabric Base, a Thin Primer Coat Containing a Thermosetting Resin and a Butadiene-Acrylonitrile Copolymer, and a Top Coat Including a Copolymer of Butadiene and Acrylonitrile.** A. J. Jennings, Bridgeport, Conn., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,405,099. **In a Method of Transferring a Drawing to a Template Blank, the Use of a Stable Backing Material Including a Moisture-Resistant Base Such as Rubber Hydrochloride.** G. B. Crouse, East Setauket, and F. A. Holt, Shoreham, assignors, by mesne assignments, to Photo-Positive Corp., New York, all in N. Y.

2,405,118. **In Apparatus for Distilling Liquids, Sheets of Flexible Waterproof Material.** W. R. P. Delano, Syosset, N. Y., and W. E. Meissner, Newark, N. J., assignors to Gallowhur Chemical Corp., New York, N. Y.

2,405,149. **Hollow Vulcanized Rubber Article with a Noise-Making Device Integrally Formed in the Wall Thereof.** D. C. Kempthorn, Akron, assignor to Sun Rubber Co., Barberton, O.

2,405,154. **Dairyman's Glove.** R. C. Logan, Dos Palos, Calif.

2,405,191. **In an Abrasive Article, Adhesive Completely Cured and Relatively Hard at Its Exposed Surface, and Partially Cured and Softer and More Yieldable Adjacent the Backing Material of the Article.** E. P. Davis, assignor to Minnesota Mining & Mfg. Co., both of St. Paul, Minn.

2,405,265. **Blood Pressure Tester.** C. H. McAlpine, Hamburg, Pa.

2,405,279. **Rubber Oil Seal.** J. H. Victor, Wilmette, assignor to Victor Mfg. & Gasket Co., Chicago, both in Ill.

2,405,326. **Ear Muffs Including an Annular Fabric Body with an Elastic Section for Resting Against the Top of the Head.** L. Plotsky, Kansas City, Mo.

2,405,330. **Insulating Structure Including a Base Element, Layers of Preformed Fibrous Sections of Siliceous Material and Impervious Sealing Material between the Layers and Covering the Outer Layer.** W. D. Ryder, Tulsa, Okla.

2,405,362. **In a Deicer System for Aircraft, Inflatable Units Mounted along Airfoil Surfaces of the Aircraft.** S. K. Lehman, Brooklyn, N. Y., and M. L. Taylor, Ridgewood, assignors to Bendix Aviation Corp., Teterboro, both in N. J.

2,405,390. **Wheel Cover of Non-Metallic Resiliently Pliable Material.** G. A. Lyon, Allenhurst, N. J.

2,405,460. **Door Seal.** G. A. Smith, assignor to General Motors Corp., both of Detroit, Mich.

2,405,484. **Combination Cushion and Life Preserver, Including a Covering of Flexible, Elastic, and Transparent Sheet Material.** G. Bailhe, Brooklyn, N. Y.

Dominion of Canada

435,810. **Rain Garment.** Archer Rubber Co., assignee of J. A. Gilbertson, both of Milford, and J. T. Callahan, West Newton, both in Mass., U.S.A.

435,811. **Reversible Garment.** Archer Rubber Co., assignee of J. A. Gilbertson, both of Milford, and J. T. Callahan, West Newton, both in Mass., U.S.A.

435,892. **Sealing Member in a Jar Closure.** G. Glocker, Washington, D. C., U.S.A.

435,899. **Make-Up Cape of Waterproof, Flexible Material.** N. Kase, Binghamton, N. Y., U.S.A.

435,982. **Belting of Textile Fabric Woven from Coarse Yarns and Rubber-Like Material.** Dunlop Tire & Rubber Goods Co., Ltd., Toronto, Ont., assignee of W. Lord and H. Riding, both of Manchester, England.

436,014. **Pressure Cabin for Aircraft Including a Structural Frame, an Airtight Inner Wall of Rubberized Textile Fabric, an Outer Envelope, Heat-Insulating Material between Inner Wall and Envelope, and Puncture-Sealing Material Lining the Inner Wall.** Vickers-Armstrongs, Ltd., London, assignee of B. N. Wallis, Weybridge, both in England.

436,015. **An Aircraft Fuselage Including a Pressure Cabin, of Which the Interior Faces of the Skin Plating Joints Are Sealed with a Coating of an Aqueous Emulsion of Bitumen and Rubber Latex.** Vickers-Armstrongs, Ltd., London, assignee of B. N. Wallis, Weybridge, both in England.

436,053. **Valved Container Including a Washer-Like Gasket Member of Resilient Material.** C. D. Thoms, New York, N. Y., U.S.A.

436,076. **Refrigerator Gasket Member Including a Hollow, Elongated Cushioning Member of Rubber-Like Material.** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of A. L. Shields, Springfield, Mass., U.S.A.

436,038. **Pneumatic Tires.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of G. R. Cuthbertson, Detroit, Mich., U.S.A.

436,092. **Pneumatic Tire Having a Carcass of Superposed Plies Consisting of Layers of Untwisted Synthetic Fiber Units Connected by a Film of Resilient Rubber Compound; These Units Include Untwisted Filaments of Relatively Large Diameter.** General Tire & Rubber Co., assignee of C. J. Jahant, both of Akron, O., U.S.A.

436,171. **Girdle with Elastic Side Sections,** E. Berdach, New York, N. Y., U.S.A.

436,230. **Ice Tray Grid Including a One-Piece Longitudinal Partition Formed of Flexible Sheet Rubber.** Gibson Refrigerator Co., assignee of Gibson Electric Refrigerator Corp., assignee of R. C. Yantis, all of Greenville, Mich., U.S.A.

436,274. **In a Quick Disconnect Coupling, Sealing Means Including a Rubber Ring Having on Its Inner Periphery a Retaining Ring for Preventing Radially Inward Displacement of the Rubber as It Is Displaced into Its Sealing Position.** Thomson Products, Inc., formerly Thompson Products, Incorporated, assignee of A. Townhill, both of Cleveland, O., U.S.A.

436,289. **Self-Sealing Container for Liquid Fuel Having a Sealing Layer of Textile Fabric Coated with a Cellulose Ester Which is Strongly Swollen, but not Dissolved by Petrol.** C. G. Bonard, administrator of the estate of H. Dreyfus, deceased, in his lifetime of London, England, assignee of W. A. Dickie and G. Rudorf, all of London, England.

436,299. **Tennis Ball.** L. M. S. Lejeune, Paris, France.

United Kingdom

578,538. **Pneumatic Tires.** H. M. Renner.

578,668. **Resilient Mountings.** United States Rubber Co.

578,841. **Inflatable Dinghies.** R. F. D. Co., Ltd., and P. W. L. Williams.

578,851. **Tire Preserver.** W. C. Carlton.

579,018. **Electric Cables.** Callender's Cable & Construction Co., Ltd., L. G. Brazier, R. M. Fairfield, and D. T. Hollingsworth.

PROCESS

United States

2,403,815-816. **Y-Type Insulated Cord.** S. M. Martin, Baltimore, Md., assignor to Western Electric Co., Inc., New York, N. Y.

2,404,406. **Plasticizing Plastic Materials.** F. M. Roddy, Providence, R. I.

2,404,636. **Simultaneously Forming a Plurality of Cellular Vulcanized Rubber Bodies of Cylindrical Shape.** W. E. Humphrey, assignor to Pennsylvania Rubber Co., both of Jeannette, Pa.

2,404,731. **Sponge Rubber Insoles.** R. H. Johnson, Indianapolis, Ind.

2,404,837. **Cotton Fabrics with Differential Elastic Properties.** C. F. Goldthwait, New Orleans, La., assignor to the United States of America, as represented by the Secretary of Agriculture.

2,405,057. **Insulated Wire.** A. Rosenstein, New York, and H. Dolan, Brooklyn, assignors to Rosenstein Bros., New York, both in N. Y.

2,405,329. **Molding Synthetic Resin Gloves.** C. F. Ruebensaal, Baltimore, assignor to Glenn L. Martin Co., Middle River, both in Md.

2,405,345. **Repressing or Shaping Cellulose Thermoplastic Sheets Produced by Expansion of Gas-Impregnated Thermoplastic Material.** A. Cooper and D. E. Partington, assignors to Expanded Rubber Co., Ltd., Croydon, England.

United Kingdom

578,567. **Endless Abrasive-Coated Sheet Material.** Minnesota Mining & Mfg. Co.

578,768. **Dinghies, Air Cushions, and Other Inflatable Bodies.** R. F. D. Co., Ltd., and P. W. L. Williams.

578,927. **Articles from Expanded Rubber and Allied Products.** Expanded Rubber Co., Ltd., and A. Cooper.

CHEMICAL

United States

2,403,448. **Composition for the Production of Tough, Flexible, Abuse-Resistant Phonograph Records, Including a Mixture of Thermoplastic Cellulose Acetopropionate, a Resin Including Glycerol Phthalate Modified with Benzoic Acid, a Plasticizer, and a Hard Wax.** J. S. Massarene, Oradell, N. J., assignor to Interchemical Corp., New York, N. Y.

2,403,450. **Synthetic Resins Obtained by Reaction of Urea and Urea Derivatives with Formaldehyde.** P. D. Morton, Riverview, and J. F. Olin, Grosse Ile, both in Mich., assignors to Sharples Chemicals, Inc., Philadelphia, Pa.

2,403,464. **Improving Oriented Fibers of Hydrolyzed Interpolymers of Ethylene with a Vinyl Organic Ester.** A. F. Smith, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,403,465. **Reacting a Hydrolyzed Interpolymer of Ethylene and Vinyl Acetate with a Compound Having Several Methylene Groups, Each of Which Is Attached to Nitrogen and Oxygen.** D. C. Pease, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,403,547. **Manufacturing Soft Impervious Bodies, Sheets, and Films from a Viscous Solution of Sodium Alginate.** W. J. S. Peschardt, Pinner, England.

2,403,686. **The Reaction Product of an Ether of a Saturated Glycol and an Unsaturated Alcohol, and an Alpha,Beta, Unsaturated Open Chain Nitrile.** E. J. Schwoegler, assignor to Wyandotte Chemicals Corp., both of Wyandotte, Mich.

2,403,707. **Lower Fatty Acid Esters of Alginic Acid.** G. E. Cunningham, N. H. Chamberlain, and J. B. Speakman, all of Leeds, assignors to Cefoil, Ltd., Maidenhead, both in England.

2,403,741. **Making Butadiene from Ethanol.** I. L. Murray, Charleston, and J. L. Marsh, South Charleston, both in W. Va., and S. P. Smith, Jr., Louisville, Ky., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,403,742. **Cyclic Process for Making Butadiene from Ethanol Vapors.** I. L. Murray, Charleston, and J. L. Marsh, South Charleston, both in W. Va., and S. P. Smith, Jr., Louisville, Ky., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,403,743. **Cyclic Process for Producing Butadiene in Which Acetaldehyde and Ethanol Are Passed over a Catalyst to Form a Mixture Including Butadiene, Unreacted Acetaldehyde and By-Products Containing Diethyl Ether.** M. E. Hitchcock, South Charleston, and J. A. Field, Charleston, both in W. Va., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,403,767. **Aluminum Isopropoxide Diresinate.** H. M. Spurlin, Marshallton, assignor to Hercules Powder Co., Wilmington, both in Del.

2,403,794. **Visible Light Transparent Plastic Including Polymeric Methyl Methacrylate and an Inorganic Salt from the Group of Thorium Nitrate, Bismuth Nitrate, and Bismuth Trichloride; the Inorganic Salt Is Present in the Plastic in an Amount Sufficient to Reduce Its Ability to Transmit X-Ray Radiations.** R. M. Goldrick, Arlington, and B. M. Marks, Newark, both in N. J., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,403,960. **Treating Vinyl Resin Articles with a Liquid Composition Containing at Least One Water-Dispersible Compound Having a Polyalkylene Polyamine Nucleus to Reduce the Tendency of Such Articles to Accumulate Charges of Static Electricity.** W. N. Stoops, South Charleston, W. Va., and A. L. Wilson, Sharpsburg, Pa., assignors to Carbide & Carbon Chemicals Corp., a corporation of N. Y.

2,403,962. **Increasing the Hardness of Styrene by Incorporating in It an Inorganic Salt Which Is a Member of the Class of Sodium Bisulfide, Sodium Sulfate, and Sodium Bisulfate and Heating the Mixture.** L. Auer, South Orange, N. J.

2,403,963. **Reaction of Benzene with Butadiene to Produce Phenyl Butenes.** W. N. Axe, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

2,403,964. **Improved Liquid Coating Composition for Containers to Prevent Adherence thereto of Tacky High Molecular Hydrocarbon Polymers, Consisting of a Low-Temperature Copolymer of an Iso-Monoolefin and a Diolefin, Petroleum Wax, Zinc Stearate, and a Light Petroleum Naphtha.** J. J. Bannon, Union, H. N. Mims, Cranford, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,403,966. **Polymerizing a Major Quantity of an Isoolefin with a Minor Quantity of a Diolefin by Means of a Solution of a Friedel-Crafts Catalyst Dissolved in an Alkyl Halide in the Presence of an Inert Deflocculating Agent, Separating the Polymer in a Dispersed Form from the Polymerization Mixture, Slurrying the Polymer in Water, and Maintaining It in a Dispersed Form after Polymerization by the Action of the Deflocculating Agent.** J. R. Brown, Jr., Westfield, and I. E. Lightbown, Cranford, both in N. J., assignors to Standard Oil Development Co., a corporation of Del.

2,404,008. **In Making Shaped Rubber Articles, the Process of Applying over Forms a Non-Flowable Highly Porous Coating Carrying an Aqueous Solution of a Latex Coagulant, and Then Applying an Aqueous Dispersion of Rubber-Like Material Including Vulcanizing Ingredients and, as a Stabilizing Agent, the Alcohol Precipitate of Colloidal Extract of Irish Moss.** P. M. Travis, Ridgewood, N. J., assignor, by mesne assignments, of one-fourth to J. D. Silberman and one-fourth to M. Hirsch, both of New York, N. Y.

2,404,033. **A Nitrocellulose-Compatible Resin Which Is the Reaction Product of Pentaerythritol, Rosin, Butyl Alcohol, and Maleic Anhydride.** H. Burrell, Paramus, N. J., assignor, by mesne assignments, to Heyden Chemical Corp., New York, N. Y.

2,404,056. **Producing Isoprene from Propylene.** E. Gorin and A. G. Oblad, both of Dallas, Tex., assignors, by mesne assignments, to Socony-Vacuum Oil Co., Inc., New York, N. Y.

2,404,103. **Isomerizing a Cis Alpha, Beta, Unsaturated Dicarboxylic Diester to the Trans Isomer, Which Includes the Step of Heating the Ester in the Presence of Dodecyl Mercaptan.** W. Scott, deceased, late of Akron, O., by R. P. Scott, executrix, assignor to Wingfoot Corp., both of Akron, O.

2,404,163. **Refining a Crude Olefinic Nitrile.** E. L. Carpenter, Old Greenwich, H. S. Davis, Riverside, and O. F. Wiedeman, Stamford, all in Conn., assignors to American Cyanamid Co., New York, N. Y.

2,404,171. **Process of Producing Cellular Hard Rubber, Which Includes Mixing with a Rubber Composition Ferrous Oxalate in Finely Divided Form.** G. M. Hamilton, assignor to Callender's Cable & Construction Co., Ltd., both of London, England.

2,404,220. **Polymerizing a Composition Including a Solution of Divinyl Benzene in a Dialkyl Benzene Having at Least Two Carbon Atoms in Each Alkyl Grouping, in the Presence of Both Vinyl Acetate and a Catalyst for the Polymerization.** G. F. D'Alelio, Pittsfield, Mass., assignor to General Electric Co., a corporation of N. Y.

2,404,251. **Improving Unstable Air-Oxidized Monocyclic Terpenes.** A. L. Rummelsburg, assignor to Hercules Powder Co., both of Wilmington, Del.

2,404,255. **An Aluminum Dialkoxide Monoresinate from the Group of Aluminum Diisopropoxide Monoresinate and Aluminum Dibutoxide Monoresinate.** H. M. Spurlin, Marshallton, assignor to Hercules Powder Co., Wilmington, both in Del.

2,404,267. **Alpha (o-Chlorophenyl) Ethyl Methacrylate.** C. E. Barnes, Acton, Mass., assignor to Polaroid Corp., Dover, Del.

2,404,268. **Transparent Resin Including a Polymer of a Cyclohexcylohexyl Methacrylate.** C. E. Barnes, Belvidere, N. J., assignor to Polaroid Corp., Cambridge, Mass.

2,404,280. **Unsaturated Nitrile.** H. A. Dutcher, Bartlesville, Okla., assignor to Phillips Petroleum Co., a corporation of Del.

2,404,292. **P-Methoxy Benzyl Methacrylate.** M. Hyman, Jr., assignor to Polaroid Corp., both of Cambridge, Mass.

2,404,293. **Reclaiming Vulcanized Waste Rubber Containing Fibrous Carbonizable Materials by Heating in an Atmosphere of Flue Gases at a Pressure not Substantially Exceeding Atmospheric Pressure and at a Temperature from 450 to 500° F. for One Hour to Two Hours.** A. Johnston, assignor to North British Rubber Co., Ltd., both of Edinburgh, Scotland.

2,404,313. **For Coating Raincoat Fabric, a Composition Including a Copolymer of Vinyl Chloride and Vinyl Acetate, Azelaic Diester**

of Monobutyl Ether of Ethylene Glycol, Pigments, and a Stabilizer for the Vinyl Resin. E. A. Rodman, Newburgh, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,322. **Eraser Composition Including Polyvinyl Acetate, Dibutyl Phthalate, and Rosin.** S. H. Southard, Richmond Hill, N. Y., assignor to Sun Chemical Corp., a corporation of Del.

2,404,357. **Improving the Surface Characteristics of Solid Methyl Methacrylate by Applying a Coating Solution Including Ethyl Silicate Hydrolyzed with at Least 15%, by Weight thereof, of Water, and a Partially Hydrolyzed Vinyl Acetate Polymer.** M. F. Bechthold, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,404,374. **Preparing Completely Halogenated Polyfluorocycloparaffins, by Heating at a Temperature of at Least 125° C. a Completely Halogenated Ethylene of the Formula $CX_2=CX_2$, Where X is Halogen and at Least Two of the Halogens Are Fluorine.** J. Harmon, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,404,392. **Emulsion Polymerization of Butadiene 1,3Hydrocarbon in Admixture with Vinylacetylene.** A. Maximoff, Milan, Italy; vested in the Alien Property Custodian.

2,404,411. **An Acetone-Soluble Resinous Glyceride of a Chlorinated Maleic Anhydride-China-Wood Oil Adduct, Which Resinous Glyceride Will Not Form a Liquid upon Heating.** H. N. Stephens, G. B. Gehrenbeck, and D. R. Guthrie, all of White Bear Lake, assignors to Minnesota Mining & Mfg. Co., St. Paul, both in Minn.

2,404,426. **Improving the Surface Characteristics of a Solid Organic Polymer by Coating with a Solution Including an Acid Polysilicic Acid Ester, a Polymer Containing Hydroxyl Groups, and a Volatile Organic Solvent.** M. F. Bechthold and P. S. Pinkney, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,404,431. **For an Ice-Cube Freezer, a Water-Repellent Coating Composition Polymerized after Application; This Composition Consists of a Urea Formaldehyde Resin and Alkyd Resin, together with a High Melting Point Wax.** R. Canter, and H. D. Geyer, both of Dayton, O., assignors to General Motors Corp., Detroit, Mich.

2,404,438. **Direct Catalytic Oxidation of Ethylene to Produce Ethylene Oxide.** T. W. Evans, Oakland, assignor to Shell Development Co., San Francisco, both in Calif.

2,404,519. **Coating Composition Including Wax and an Aqueous Dispersion of Polyvinyl Acetate Produced by Emulsion Polymerization.** G. O. Morrison and H. M. Collins, both of Shawinigan Falls, assignors to Shawinigan Chemicals Ltd., Montreal, both in P. Q., Canada.

2,404,585. **Latex Containing Sulfur, a Benzothiazyl Accelerator Substantially Free of Zinc Oxide, and to Activate the Accelerator, Red Lead Oxide** E. Schmidt, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,404,608. **In Compounding Rubber, the Incorporation of a Dehydrated Resin Obtained from the Sludge Reaction Product of Coke Oven Light Oil Washed with Concentrated Sulfuric Acid.** J. H. Wells and P. J. Wilson, Jr., both of Pittsburgh, Pa., assignors to Carnegie-Illinois Steel Corp., a corporation of N. J.

2,404,695. **As a New Compound 2,5-Dichloro Phenyl Sulphenamide.** R. A. Coleman, Naugatuck, Conn., assignor to United States Rubber Co., New York, N. Y.

2,404,700. **Vinyl Ethers.** W. J. R. Evans, Blackley, Manchester, England, assignor to Imperial Chemical Industries, Ltd., a corporation of Great Britain.

2,404,711. **Polymerization Products from Aromatic Vinyl Compounds and Aromatic Carbonyl Compounds.** U. Hoffman and H. Meis, both of Marl, Kreis Recklinghausen, Germany; vested in the Alien Property Custodian.

2,404,713. **Forming Clear and Substantially Colorless Solutions of an Acryonitrile Polymer.** R. C. Houtz, Snyder, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,714. **As a New Composition of Matter, a Polymer of Acrylonitrile and a Dimethyl Carbamyl Compound.** G. H. Latham, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,404,715. **As a New Composition of Matter, a Polymer of Acrylonitrile Dissolved in an Organic Nitrile Compound.** A. O. Rogers, Lewiston, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,716. **A Polymer of Acrylonitrile Dissolved in a Dimethyl Amide Nitrile Compound.** V. L. Hansley, Niagara Falls, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,717. **Acrylonitrile Polymer Solution.** R. C. Houtz, Snyder, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,718. **Polymer of Acrylonitrile Dissolved in an Organic Thiocyanomethylene Compound.** R. C. Houtz, Snyder, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,719. **Polymer of Acrylonitrile Dissolved in a Cyclic Organic Compound.** R. C. Houtz, Snyder, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,720-21. **Polymer of Acrylonitrile Dissolved in an Aromatic Compound.** R. C. Houtz, Snyder, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,722. **Polymer of Acrylonitrile Dissolved in a Cyclic Compound.** R. C. Houtz, Snyder, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,723. **Polymer of Acrylonitrile Dissolved in an Organic Compound.** R. R. Merner, Deerfield, Ill., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,724. **Polymer of Acrylonitrile Dissolved in N,N-dimethylmethoxyacetamide.** R. C. Houtz, Snyder, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,725. **Polymer of Acrylonitrile Dissolved in N,N-dimethylcyanamide.** A. O. Rogers, Lewiston, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,726. **New Composition of Matter Including a Polymer of Acrylonitrile and a Compound from the Class of Hydracrylonitrile and Glycolonitrile.** W. H. Charch, Buffalo, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,727. **New Composition of Matter Including a Polymer of Acrylonitrile and a Compound from the Class of Malonitrile, Methylene Thiocyanate, and Cyanomethylene Thiocyanate.** R. C. Houtz, Snyder, N. Y., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,728. **Forming Clear and Substantially Colorless Solutions of Acrylonitrile Polymer, by Dissolving the Acrylonitrile Polymer in a Finely Divided State in a Solvent Containing a Gaseous Acidic Anhydride.** T. G. Finzel, Cleveland, O., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,779. **Polymerization Process for Obtaining a Resinous Material by Emulsifying a Mixture Containing an Asymmetrical Dihalogenated Ethylene and a Polymerizable Compound from the Group of an Alkyl Ester and Nitrile of an Alpha-Methylene Monocarboxylic Acid, in Aqueous Medium, a Dissolved Salt of Perdisulfuric Acid, and a Dispersing Agent.** H. W. Arnold, Marshallton, assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington, both in Del.

2,404,780. **Resinous Material Obtained by Polymerizing an Emulsion of Vinyl Chloride in Admixture with a Fumaric Diester of a Saturated, Single Monohydric Alcohol in an Aqueous Medium, and Containing a Catalytic Amount of a Dissolved Salt of Perdisulfuric Acid and a Dispersing Agent.** H. W. Arnold, assignor to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, Del.

2,404,781. **Obtaining a Resinous Material from an Emulsion in Aqueous Medium of a Mixture of a Vinyl Halide with an Alkyl Ester of an Alpha-Methylene Aliphatic Monocarboxylic Acid, and Containing a Dissolved Salt of Perdisulfuric Acid and a Dispersing Agent.** H. W. Arnold, Wilmington, Del., M. M. Brubaker, Boothwyn, Pa., and G. L. Dorough, Niagara Falls, N. Y., assignors to E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

2,404,787. **Hydroxy-Di-(Dihydronordicyclopentadiene).** H. A. Bruson, assignor to Resinous Products & Chemical Co., Philadelphia, Pa.

2,404,791. **Obtaining a Resinous Material from an Emulsion in Aqueous Medium of a Vinyl Halide: the Medium Contains a Dissolved Salt of Perdisulfuric Acid and a Dispersing Agent.** D. D. Coffmann and F. C. McGrew, assignors to E. I. du Pont de Nemours & Co., Inc., all of Wilmington, Del.

2,404,817. **Polymerization Process Which Includes Emulsifying a Mixture of Asymmetrical Dichlorethylene with Acrylonitrile in an Aqueous Solution Containing a Dispersing Agent from the Group of Alkali Metal Salts of Long Chain Sulfates and Sulfonates, and an Oxygen-Yielding Polymerization Catalyst.** D. E. Strain, assignor to E. I. du Pont de Nemours & Co., Inc., both in Wilmington, Del.

2,404,836. **New Resin Product Consisting of the Copolymer of a Compound of the Class of Cyclopentadiene and Dicyclopentadiene, and an Alkyd Resin.** H. L. Gerhart and L. M. Adams, both of Milwaukee, Wis., assignors to Pittsburgh Plate Glass Co., a corporation of Pa.

2,404,840. **Resin Obtained by Heating a Mixture Including Lignin and a Thermosetting Heat-Reactive Acid Condensation Product of Formaldehyde and a Material from the Group of Furfuryl Alcohol and a Fusible Acid Condensation Product of Furfuryl Alcohol.** M. T. Harvey, South Orange, N. J., assignor to Harvel Research Corp., a corporation of N. J.

2,404,892. **Shellac Modified Resin Obtained by Reacting an Aromatic Amine Having an NH_2 Group Attached to a Benzene Ring with Shellac and Formaldehyde.** M. J. Scott, Stamford, Conn., assignor to American Cyanamid Co., New York, N. Y.

2,404,929. **Vinyl Ester of Halogenated Beta-Formyl-Acrylic Acids.** R. B. Seymour, Dayton, O., assignor to Monsanto Chemical Co., a corporation of Del.

2,405,008. **Reducing the Heat Shrinkage of a Shaped Object of an Oriental, Halogen-Containing Polymer of a Monoethylenic Unsaturated Compound Having the Halogen Attached to Intralinear Carbon.** K. L. Berry, Hockessin, and J. W. Hill, assignors to E. I. du Pont de Nemours & Co., Inc., both in Wilmington, all of Del.

2,405,041. **Mixing a Toluene-Soluble Methyl Polysiloxane Resin with a Nitroparaffin and Recovering the Portion of the Resin Insoluble in the Nitroparaffin.** K. N. Mathes and B. A. Wasiewicz, Schenectady, N. Y., assignors to General Electric Co., a corporation of N. Y.

2,405,336. **Polymerized Chloroprene Rubber Having Uniformly Dispersed therein a Magnesia and Carbon-Containing Product Obtained as a Residue from the Distillation of Crude Magnesium Condensate Produced in the Carbothermic Process for Making Magnesium.** G. v. Stroh, Berkeley, assignor to Permanente Metals Corp., Oakland, both in Calif.

2,405,343. **Rubber Hydrochloride Composition Stabilized by the Reaction Product of an Aliphatic Aldehyde and an Ethylene Polyamine.** J. P. Chittum and G. E. Hulse, both of Passaic, N. J., assignors to United States Rubber Co., New York, N. Y.

2,405,480. **In a Polymerization Process Wherein Olefinic Material Is Reacted at Below Atmospheric Temperature to Produce Vulcanizable Polymer in the Presence of a Friedel-Crafts-Type Catalyst as a Chilled Stream Projected into Space, the Steps of Forming This Stream into a Sheet after a Substantial Portion of the Olefinic Material Has Reacted to Form Vulcanizable Polymer.** H. D. Wilde Houston, Tex., assignor to Standard Oil Development Co., a corporation of Del.

Dominion of Canada

435,857. **Crack Sealer Composition Including an Aqueous Emulsion of Bitumen Mixed with Ground Vulcanized Rubber, Bentonite, and Mineral Fiber.** Patent & Licensing Corp., New York, N. Y., assignee of E. O. Groskopf, Rutherford, N. J., both in the U.S.A.

435,912. **Bandage Coated on Both Sides with a Composition Including an Unsaturated Solid Solution of a Polyvinyl Acetate in Dibutyl Phthalate.** R. Stone, Chicago, Ill., U.S.A.

435,939. **Finishing Textile Fibers by Exhausting thereon a Highly Dispersed Polymerized Vinyl Compound from a Dilute Aqueous Suspension of the same.** Canadian Industries, Ltd., Montreal, P. Q., assignee of J. E. Smith, Wilmington, Del., U.S.A.

435,940. **Methyl Hydroxyacetate.** Canadian Industries, Ltd., Montreal, P. Q., assignee of D. J. Loder, Wilmington, Del., U.S.A.

435,941. **Copolymer of Divinyl Formal and Vinyl Acetate.** Canadian Industries, Ltd., Montreal, P. Q., assignee of D. D. Coffman, Wilmington, Del., U.S.A.

435,945. **A Polyhydric Alcohol Mixed Ester of a Monocarboxylic Acid.** Canadian Industries, Ltd., Montreal, P. Q., assignee of M. E. Cupery, Wilmington, Del., U.S.A.

435,947. **A Polyhydric Alcohol Mixed Ester of a Beta-Furylacrylic Acid and a Monofunctional Monocarboxylic Acid of Different Structure.** Canadian Industries, Ltd., Montreal, P. Q., assignee of H. S. Rothrock, Wilmington, Del., U.S.A.

435,949. **A Beta-Furylacrylic Acid-Modified Alkyd Resin.** Canadian Industries, Ltd., Montreal, P. Q., assignee of H. S. Rothrock, Wilmington, Del., U.S.A.

435,953. **A Polyhydric Alcohol Ester of a Thienylacrylic Acid.** Canadian Industries, Ltd., Montreal, P. Q., assignee of M. M. Brubaker, Boothwyn, Pa., U.S.A.

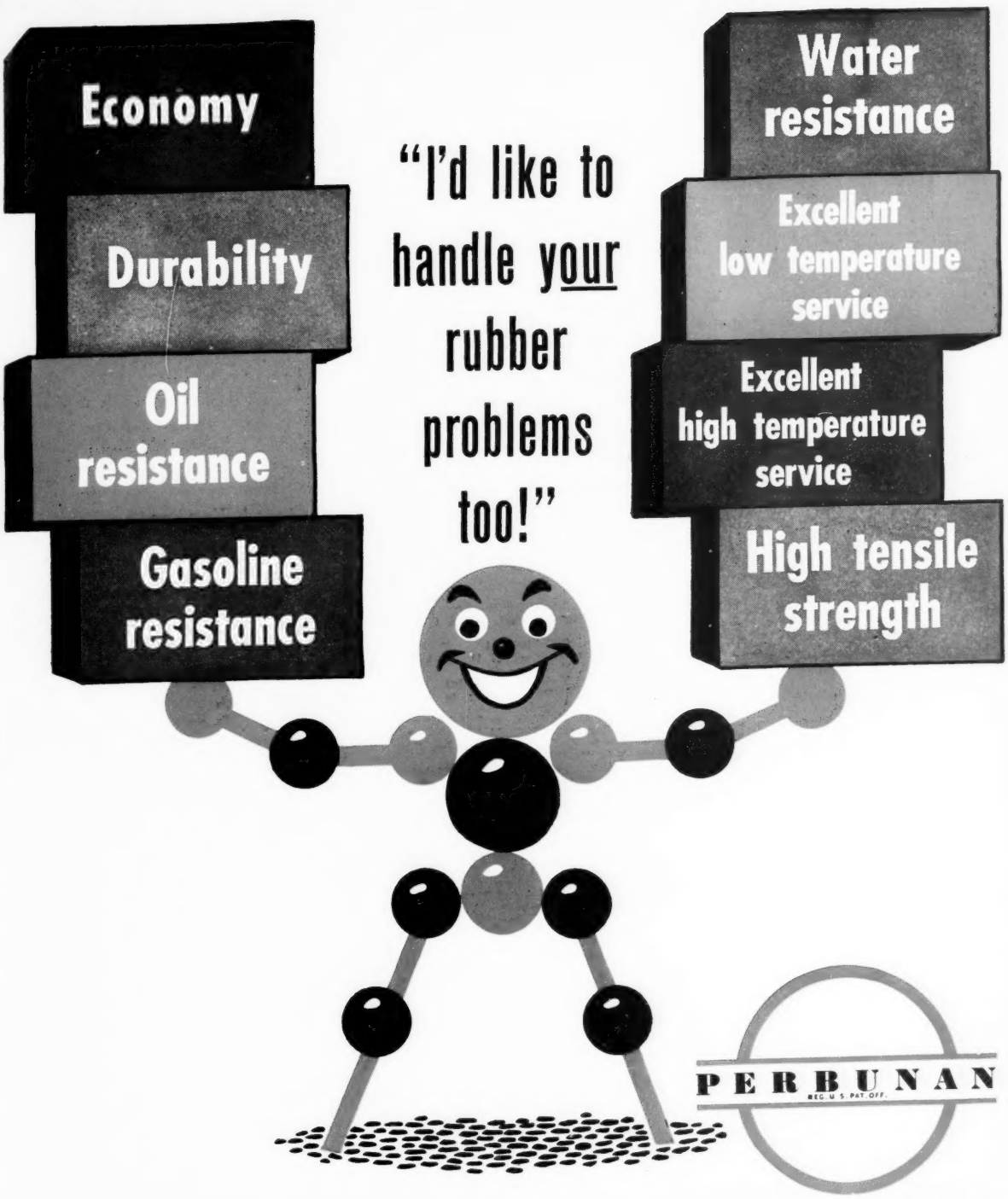
435,954. **A Polyhydric Alcohol Ester of an Acylacrylic Acid.** Canadian Industries, Ltd., Montreal, P. Q., assignee of M. E. Cupery, Wilmington, Del., U.S.A.

435,958. **Obtaining Leather from Rawhide, by Impregnating the Rawhide with Polyvinyl Alcohol and Then Treating It with a Tanning Agent.** Canadian Industries, Ltd., Motreal, P. Q., assignee of C. Coolidge, Wilmington, Del., U.S.A.

435,959. **Copolymer of Trichlorethylene and Vinyl Trimethylacetate.** Canadian Industries, Ltd., Montreal, P. Q., assignee of W. R. Cornthwaite, Niagara Falls, N. Y., U.S.A.

435,960. **Resinous Composition Obtained by Reacting in the Presence of Water, Urea and an Aldehyde, and the Salt Obtained from Substantially Equimolecular Proportions of Diamine and Dibasic Carboxylic Acid.** Canadian Industries, Ltd., assignee of F. W. Hoover and G. T. Vaala, both of Wilmington, Del., U.S.A.

435,961. **Water-Soluble, Surface-Active Condensation Product from 1-Dodecylthiosorbitol and Alpha-Methyl Glucoside.** Canadian Industries, Ltd., Montreal, P. Q., assignee of P. L. Salzberg and J. H. Werntz, both of Wilmington, Del., U.S.A.



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435,962. **Floor Covering Including an Asphalt Impregnated Paper Base and a Coating Containing a Gelled Polyhydric Alcohol Mixed Ester of a Polyunsaturated Monocarboxylic Acid.** Canadian Industries, Ltd., Montreal, P. Q., assignee of M. E. Cupery, Wilmington, Del., U.S.A.

435,966. **Insulating Filling Composition Consisting of Inorganic Insulating Solid Particles and a Liquid Compound Including a Petroleum Asphalt and a Chlorinated Diphenyl.** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of C. F. Hill, Swissvale, Pa., U.S.A.

435,968. **Insulation Including Mica and a Binder Composed of the Copolymer of the Ester of Equimolecular Amounts of an Alpha,Beta Unsaturated Dibasic Acid and a Glycol, with One or More Substances from the Group of Monostyrene and Simple Methyl Substituted Monostyrenes.** Canadian Westinghouse Co., Ltd., Hamilton, Ont., assignee of N. C. Foster, L. R. Hill, and E. L. Schulman, all of Wilkinsburg, and R. H. Runk, Pittsburgh, both in Pa., U.S.A.

435,974. **Molding Composition Including a Resin Prepared by an Acid Catalyzed Reaction of Formaldehyde with Phenol and an Oil from the Group of Fatty Drying Oils Having Conjugated Double Bonds and Blown Fatty Drying and Semi-Drying Oils.** Carbide & Carbon Chemicals, Ltd., assignee of Bakelite Corp. of Canada, Ltd., both of Toronto, assignee of A. P. Mazzucchelli, Bloomfield, N. J., U.S.A.

436,807. **For Joining together a Body of a Hardened Formaldehyde Condensation Product and Another Body, an Adhesive Including an Aniline-Formaldehyde Condensation Product and an Initial Phenol-Formaldehyde Condensation Product.** Resinous Products & Chemicals Co., Philadelphia, Pa., U.S.A., assignee of Aero Research, Ltd., Duxford, assignee of deHavilland Aircraft Co., Ltd., Hatfield, who with Aero Research Co. was assignee of N. A. de Bruyne and C. A. A. Rayner, both of Duxford, both in England.

436,046. **Reacting a Phenol, a Ketone, Formaldehyle, an Acidic Natural Resin, and a Terpenic Material to Obtain a Resinous Product.** I. Rosenblum, New York, N. Y., U.S.A.

436,084. **Gummed Sheet Material Including a Paper Backing and an Exposed Dry Coating of Water-Activatable Adhesive in Continuous Phase and a Latex Filler in Discontinuous Phase.** Dennison Mfg. Co., assignee of C. W. Stillwell, both of Framingham, Mass., U.S.A.

436,155. **A 2-Cyanoethyl 2-Thiazyl Sulfide.** Wingfoot Corp., Wilmington, Del., assignee of A. M. Cliffor and J. G. Lichty, both of Stow, O., both in the U.S.A.

436,211. **Ethylene Glycol Monoglycolate.** Canadian Industries, Ltd., Montreal, P. Q., assignee of D. J. Loder, Wilmington, Del., and W. O. Teeters, Bergenfield, N. J., both in the U.S.A.

United Kingdom

578,229. **Resinous Condensation Products.** W. Charlton, J. B. Harrison, and Imperial Chemical Industries, Ltd.

578,233. **Gas-Expanded Ebonite.** Expanded Rubber Co., Ltd., and A. Cooper.

578,264. **Cellular Resin Material.** N. A. de Bruyne.

578,266-267. **Polymerized Product.** F. J. Cleveland (Pittsburgh Plate Glass Co.).

578,279. **Separation of Acetone and Butanol from Fermentation Liquors Containing Them.** M. Sulzbacher.

578,304. **Adhesive Compositions.** B. B. Chemical Co., Ltd., L. E. Puddefoor, and K. J. George.

578,365. **Plastic Elastic Rubber-Like Substances.** Standard Oil Development Co.

578,367. **Filaments, Threads, Fibers, Films, Bands, Etc.** Cooperative Condensfabriek Friesland.

578,404. **Low-Density Materials from Viscose Sponge.** J. I. Jones.

578,405. **Vinyl Esters.** Distillers Co., Ltd., J. J. P. Staudinger, P. D. Coppock, and D. J. Hadley.

578,482. **Reclaiming Vulcanized Synthetic Rubber-Like Materials.** Dunlop Rubber Co., Ltd., P. H. Amphlett, A. J. Hughes, and D. F. Twiss.

578,484. **Alkyd Resin Coating Compositions.** E. I. du Pont de Nemours & Co., Inc., R. K. Iler, G. H. Latham, and J. W. Robinson.

578,513 and 578,525. **Expanded Thermoplastic Resinous Compositions.** Expanded Rubber Co., Ltd., A. Cooper and W. E. Partington.

578,540. **Polyethylene Glycol Compositions.** British Thomson-Houston Co., Ltd.

578,584. **Polymers and Interpolymers of Ethylene.** E. I. du Pont de Nemours & Co., Inc.

578,643. **Urea-Aldehyde Compositions.** E. I. du Pont de Nemours & Co., Inc.

578,656. **Treatment of Polysulfide Resins.** L. A. Jordan, J. K. Aiken, and G. L. Holbrow.

578,660. **Plasticizing Rubber-Like Polymeric Materials.** J. M. Huber Corp.

578,703. **Gutta Percha-Like Artificial Substances.** R. Staeger.

578,767. **Interpolymerization of Vinyl Acetate and Methyl Methacrylate.** Imperial Chemical Industries, Ltd.

578,838. **Cellular Materials.** Expanded Rubber Co., Ltd., A. Cooper, and D. E. Partington.

578,846. **Polymeric Materials from Butadiene or Its Homologs.** E. G. Edwards, D. B. Kelly, W. M. Morgan, and Imperial Chemical Industries, Ltd.

578,849. **Polymerization Process.** Distillers Co., Ltd., J. J. P. Staudinger, and D. A. Bennett.

578,867. **Cyclopentadiene Addition Products.** P. G. Carter, H. Plimmer, and Imperial Chemical Industries, Ltd.

578,869. **Dielectric Compositions.** Westinghouse Electric International Co.

578,882. **Resinous Lacquers or Enamels.** British Insulated Cables, Ltd., and J. F. Cowen.

578,884. **Heat Resistance of Thermoplastic Materials.** Expanded Rubber Co., Ltd., and A. Cooper.

578,888. **Polymeric Materials.** C. Arnold (Standard Oil Development Co.).

578,966. **Preservation of Rubber Compositions.** United States Rubber Co.

578,992. **Polymerization of Olefinic Compounds.** E. I. du Pont de Nemours & Co., Inc.

579,022 and 579,023. **Films Consisting Essentially of Normally Solid Ethylene Polymers.** E. I. du Pont de Nemours & Co., Inc.

MACHINERY

United States

2,403,476. **Extrusion Die.** K. L. Berry, Hockessin, and J. R. Downing, assignors to E. I. du Pont de Nemours & Co., Inc., both of Wilmington, both in Del.

2,403,482. **Apparatus for Enclosing Articles in Elastic Sheet Material.** W. S. Cloud, Wilmette, Ill.

2,403,914. **Colloidal Mill.** E. G. Eppenbach, Manhasset, assignee of H. Imshaug, Flushing, both in N. Y.

2,404,314. **Molding Apparatus.** H. G. Rogers, Wellesley Hills, assignor to Polaroid Corp., Cambridge, both in Mass.

2,404,449. **Machine for Stitching a Tread on a Tire Carcass.** C. S. McChesney, Kenmore, assignor to Dunlop Tire & Rubber Corp., Buffalo, both in N. Y.

2,404,559. **Plastic Injection Molding Machine.** B. D. Ashbaugh, Mount Gilead, O., assignor to Hydraulic Development Corp., Inc., Wilmington, Del.

2,404,582. **Apparatus for Making Sheet Material.** G. P. Bosomworth, assignor to Firestone Tire & Rubber Co., both of Akron, O.

2,404,583. **Tire Removing Tool.** W. H. McCollister, assignor to the Firestone Tire & Rubber Co., both of Akron, O.

2,404,630. **Extruder of Plastics.** F. T. Griffiths, Gravesend, assignor to W. T. Henley's Telegraph Works Co., Ltd., Dorking, both in England.

2,404,989. **Vulcanizer.** P. Schmid, Jamaica, and H. Hylton, assignors to Acme Air Appliance Co., Inc., both of Brooklyn, both in N. Y.

2,405,039. **Die Unit for Extruding Small Shapes of Organic Material.** R. S. Jesionowski, assignor to Plax Corp., both of Hartford, Conn.

2,405,077. **Vulcanizing Apparatus Including an Elongated Vulcanizing Chamber and Separate Means for Admitting and Withdrawing Articles.** E. J. von der Heide, Akron, O.

Dominion of Canada

435,942. **Apparatus for Shaping Thermoplastic Sheets.** Canadian Industries, Ltd., Montreal, P. Q., assignee of R. E. Leary, Newark, N. J., U.S.A.

435,975. **Apparatus for Extruding from an Extrusion Aperture a Thermosetting Resinous Composition Which Remains only Transiently Deformable after Extrusion.** Cellomold, Ltd., assignee of F. H. Churchman and D. N. Davies, all of Feltham, Middlesex, England.

436,154. **Apparatus for the Manufacture of Rubber Hydrochloride Film.** Wingfoot Corp., assignee of F. H. Manchester, both of Akron, O., U.S.A.

UNCLASSIFIED

United States

2,403,449. **Hose Clamp.** G. Meyer and C. G. Woodmansee, assignors to Lane-Wells Co., all of Los Angeles, Calif.

2,403,606. **Hose Clamp.** G. Meyer, assignor to Lane-Wells Co., both of Los Angeles, Calif.

2,404,041. **Applicator for U-Shaped Attaching Members of a V-Belt Fastener.** H. L. Coats, Wheaton, Ill., assignor to Flexible Steel Lacing Co., Chicago, Ill.

2,404,534. **Tire Rack.** F. L. Sargent, Burlingame, and W. J. Crader, Mountain View, both in Calif.

2,404,584. **Bending Modulus Test Apparatus.** J. W. Liska, Stow, and F. S. Grover, assignors to Firestone Tire & Rubber Co., both of Akron, both in O.

2,404,801. **Reinforcing Expander Tube.** C. Hollerith, Jackson, Mich., assignor, by mesne assignments, to B. F. Goodrich Co., Akron, O.

Dominion of Canada

435,787. **Hose Nozzle.** A. Nielsen, Oakland, Calif., U.S.A.

436,081. **Anti-Skid Tire Device.** John J. Cook Mfg. Corp., assignee of J. J. Cook, both of Detroit, Mich., U.S.A.

436,087. **Drier for Cords or Yarns.** Dominion Rubber Co., Ltd., Montreal, P. Q., assignee of M. Castricum, Grosse Pointe, Mich., U.S.A.

436,165. **Anti-Skid Chain.** J. T. Giroux, Montreal, P. Q.

436,198-199. **Flexible Hose Coupling.** Bowden (Engineers), Ltd., assignee of W. A. Melson, both of London, England.

436,204. **Cable Connector.** Burndy Engineering Co., Inc., New York, assignee of B. Dibner, Crompond, both in N. Y., U.S.A.

United Kingdom

577,766. **Overall Chains for Road Vehicle Wheels.** D. S. Kennedy.

577,982. **Drying Textiles.** Dunlop Rubber Co., Ltd., and J. W. Illingworth.

578,037. **Clips for Securing Hose to Metal and Other Tubes.** A. W. Beuttell.

578,496. **Instruments for Measuring Properties of Rubber and Rubber-Like Materials.** W. T. Henley's Telegraph Works Co., Ltd., and H. A. Macdonald.

578,761. **Apparatus for Removing Tires from Wheels.** Dunlop Rubber Co., Ltd., and R. F. Daw.

578,794. **Electrical Devices for Sensing Holes in Insulating Sheet Material.** British Tabulating Machine Co., Ltd.

578,928. **Belt Fasteners.** H. Rothwell.

578,983. **Tire Valve Connectors.** M. G. Gosling.

TRADE MARKS

United States

421,488. **"Accwire."** Wire and cable. Accurate Insulated Wire Corp., New Haven, Conn.

421,504. Representation of a girl sitting upon a feather. Girdles. M. Henkin, doing business as Ladilastics, New York, N. Y.

421,521. Representation of a playing card king enclosed in an inner circle with the words: **"Visking Product,"** written around the edge and enclosed within another circle. Netting of plastic monofilaments made from polymeric vinylidene chloride and copolymers thereof. Visking Corp., Chicago, Ill.

421,523. **Hedge-Hoppers.** Footwear. E. Garofalo Mfg. Corp., New York, N. Y.

421,533. **Hyer.** Footwear. C. H. Hyer & Sons, Olathe, Kan.

421,551. **Lowdi.** Electrical resistance wire. C. O. Jelliff Mfg. Corp., Southport, Conn.

421,562. **Eas-E-Go.** Hose couplings. W. H. Tandet, doing business as Main Machine Co., Stamford, Conn.

421,615. The word: **"Kanthal,"** within a fanciful ring. Wire and cables, electric resistance wire, strip and coils. Aktiebolaget Kanthal, Hallstahammar, Sweden.

421,709. Representation of a man wearing a blindfold, and the word: **"Blindfolded."** Raincoats. M. W. Frommer, doing business as Wells Clothes, Philadelphia, Pa.

421,765. Representation of a keystone containing the letter: **"P."** Tennis balls, hand balls, and shuttlecocks. Pennsylvania Rubber Co., Jeannette, Pa.

421,781. **Solac.** Cements. Maas & Waldstein Co., Newark, N. J.

421,791. **Termacuseal.** Insulation. R. F. Hlavaty, doing business as Hlavaty Insulations, Cicero, Ill.

421,843. **Latexol.** Cement. E. Cole, Columbus, O.

421,849. **Partisan.** Inner tubes. Atlas Supply Co., Newark, N. J.

421,850. **Mate.** Inner tubes. Atlas Supply Co., Newark, N. J.

(Continued on page 134)

Squeezing out COSTLY PLASTICIZERS

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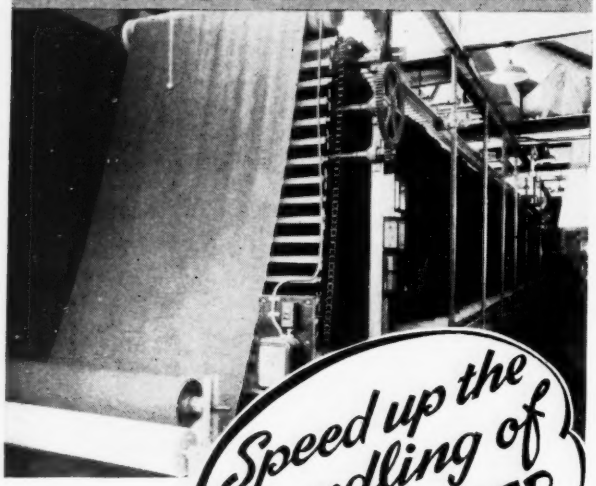

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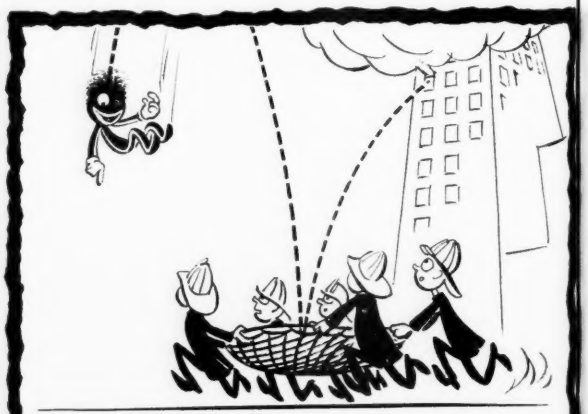
Taber Thermofold Plastic Folding Machine

Plastic Sheet Folding Machine

THE "formed fold," a new achievement in the field of sheet plastics fabrication, has been made practical with the development of the thermofold plastic folding machine by Plastics Equipment Division, Taber Instrument Corp., North Tonawanda, N. Y. With this new development plastic sheeting of from 0.005- to 0.020-inch in thickness can now be folded into a "U" type, 180-degree fold, with the sides tight together. Providing a controlled folding cycle, the machine enables the average operator to produce 700 formed folds per hour. Rate of output may be substantially increased by folding in multiples whenever practicable.

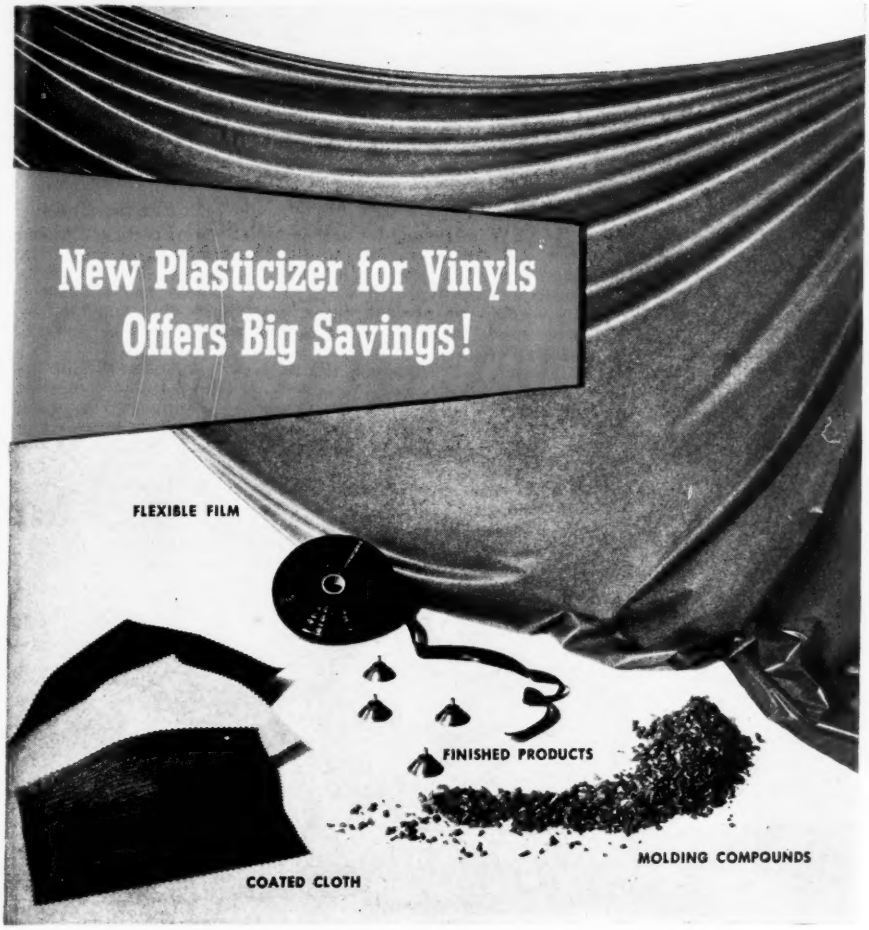
Through the use of thermostatically controlled heat, the unit forms a fold in the plastic sheeting by actually molding the material into the desired fold and, in that way, eliminates the many faults of a crease or bend. The unit is fully adjustable to accommodate satisfactorily all types of thermoplastic sheeting, size, and thickness of fold.

The machine is handsomely finished and streamlined, with the accent on maintenance ease. Hand fed and foot operated, the unit provides an automatically controlled folding cycle which is said to assure consistently dependable, uniform results. Light, yet sturdy construction is achieved through the use of aluminum and fabricated steel. The mechanism is completely enclosed, but is readily accessible through hinged end doors, and it requires little or no servicing because it employs prelubricated ball bearings and oilless bushings. As a result, operation is practically effortless, and the necessity and cost of a power drive are avoided.



FOR HIGH RESILIENCE USE PHILBLACK A

FOR FURTHER DETAILS, SEE AD ON PAGE 4



Socony-Vacuum Product can be used as Total or Partial Replacement for Other Softeners—

★ Emphasizing economy and efficiency in processing, Socony-Vacuum now offers the rapidly expanding vinyl resin industry a special low-cost plasticizer.

This special plasticizer—S/V Sovaloid C—costs only a fraction of the price of conventional softeners. Yet, it can be used either as a total or a partial replacement for these more expensive products.

Completely compatible with all vinyl compounds, S V Sovaloid C gives excellent physical properties to the finished products. It adds greater tensile strength than other plasticizers and it imparts good flexibility at normal temperatures. It will not migrate from finished vinyl products.

Your Socony-Vacuum Representative will be glad to give you full details about this special plasticizer. See him and see how much you can save!

Better, Lower-Priced PROCESSING for all types of RUBBER

★

GR-S PROCESS AID
S/V Sovaloid C

Assists compounding, speeds handling.

★

GR-S PLASTICIZERS
S/V Sovaloids H & W

Extend GR-S, produce durable compounds.

★

LOW TEMP. FLEXIBILITY
S/V Sovaloid L

Retards stiffening of Neoprene.

★

NEOPRENE SOFTENER
S/V Sovaloid N

No "blooming," even with large amounts.

★

SUN-CHECK WAX
S/V Product 2243

Prevents surface cracking on natural and GR-S compounds.

★

GR-N PLASTICIZER
S/V Sovaloid C

Fully compatible with all grades of GR-N.

★

SPONGE RUBBER
Special Petrolatum Emulsion

Assists manufacture of Neoprene sponge.

★

GENERAL PROCESS AID
S/V Sovaloid A

Assists compounding GR-S and Neoprene.

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Magnolia Petroleum Company,
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Process Products
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INVESTIGATE
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Research and Service

Scott Tester Data Sheets are yours for the asking. Request Complete Set for your Maintenance Man's information and guidance.

MAINTENANCE DATA SHEET NO. 6

RECORDER

For providing elongation measurements, the autographic recorder is the most convenient, accurate method. To insure accuracy, observe the following.

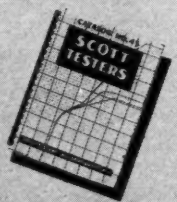
Pen slides MUST be kept free of dirt, rust or foreign matter that would add undue friction. All moving parts between the weighing head and the pen or sparking point must be clean. On pendulum type testers, wipe the slide bar with an oily cloth at least once daily. Avoid using more than a small drop of oil at any one point of contact in the pen mechanism.

All parts of the recorder which drive the platen, and the pulleys or slide guiding the platen, must move freely; use a few drops of light machine oil.

To verify elongation record obtained from the recorder: Return the clamps to normal starting position. Place a chart in the holder so that the pen indicates zero load and zero elongation. Measure the distance between the butts of the clamps (or some other bench mark) to the nearest 0.01", calling it Cn (normal clamp distance).

Test the location of the chart in the holder by operating the machine without any sample. The pen line should coincide with the chart axis showing zero load and variable elongation. If necessary, re-position chart to obtain this coincidence. Then, without any sample in the clamps, operate the tester to 1.0" elongation on the chart. Measure the distance between the bench marks, which should equal Cn plus the elongation on the chart. Repeat this at 2.0" and 3.0" on the chart. Any discrepancy between the recorded elongation and the actual increase in distance between the clamps is a recording error due to faulty chart spacing.

The many Scott Testers supply the needs of testing textiles, rubber, wire, paper, etc., up to 1 ton tensile.



REQUEST "CATALOG & DATA BOOK NO. 45"

SCOTT TESTERS, INC.

90 Blackstone St., Providence, R. I.

Operating accessories of the machine include an electric switch; two indicator lights, one for the current and the other to indicate functioning of the thermostatic heat control; dial-type thermometer for registering temperature of the heated folding blade of 16-inch capacity; and adjustable thermostat to regulate folding blade temperature.

Insulation Resistance Tester

A NEW instrument for testing insulation resistance in A.C. and D.C. equipment has been announced by Ideal Industries, Inc. The tester provides a quick, reliable method of checking insulation resistance in all types of circuits and equipment. Its regular use prevents insulation failures that might otherwise result in costly production delays, shutdowns, and expensive repairs.

Entirely self-contained, the tester is ready for instant use anywhere. There are no batteries or external power supplies, no brushes or commutators to require attention. The necessary power is provided by a small internal hand-generator which is operated by the slow turning of a crank, which can be turned in either direction. Correct testing voltage is indicated by two small button lights that glow at 500 volts D.C. When the crank is turned faster than necessary, an electronic voltage regulator controls the voltage to the meter so that a true reading is obtained.

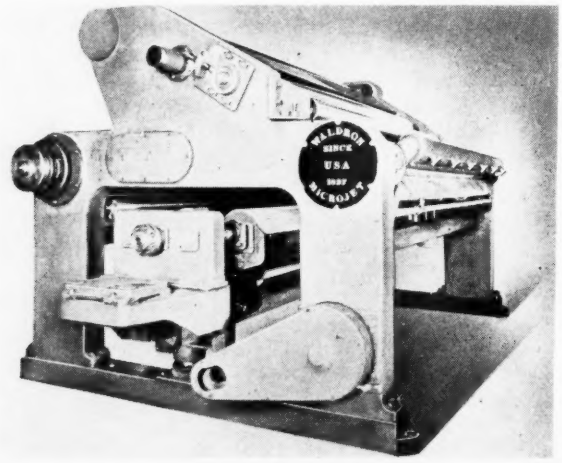
New Ideal Testing Instrument

The test range is 0-100 megohms. The meter is a rugged D'Arsonval type and is furnished in a lightweight, two-piece aluminum case. The resistors are precision wire wound, and the insulation is polystyrene for high dielectric strength. The testing leads are 10 inches long, and the testing voltage 500 volts D.C. Dimensions of the tester are 3⅜ inches wide by 6 inches long by 3¼ inches high. Weight of the instrument is three pounds, and 3½ pounds with the leather carrying case.

Completely Coordinated Coating Machine

THE "Microjet" Coater, recently developed by John Waldron Corp., New Brunswick, N. J., constitutes the first completely coordinated coating machine to replace the groups of individual pieces of equipment that heretofore have been assembled for such work. The coating is applied through the medium of a roll in an excess amount. The "Microjet" coat-

(Continued on page 125)



New Waldron "Microjet" Coater

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ACCELERATOR #49...AERO** AC 50... AERO** AC 165, self-activating accelerator for GR-S**

PEPTON 22...K & M Magnesium Oxide...K & M Magnesium Carbonate...AEROSOL* Wetting Agents**

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WHEN PERFORMANCE COUNTS...CALL ON CYANAMID

SALES REPRESENTATIVES TO THE RUBBER INDUSTRY AND STOCK POINTS: Akron Chemical Company, Akron, Ohio • Ernest Jacoby & Company, Boston, Mass. • Herron & Meyer, Chicago, Ill. • H. M. Royal, Inc., Los Angeles, Calif • H. M. Royal, Inc., Trenton, N. J. • In Canada: St. Lawrence Chemical Company Ltd., Montreal & Toronto.

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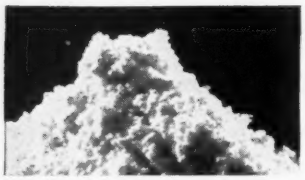
Behind the Filler - the **RESEARCH** *that fits it to your need* **EXACTLY**



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With crude, synthetic or reclaim stocks, "Filfloc" minimizes marking and enhances abrasion and tear resistance. Maximum results are aided by our Research assistance which we gladly offer.

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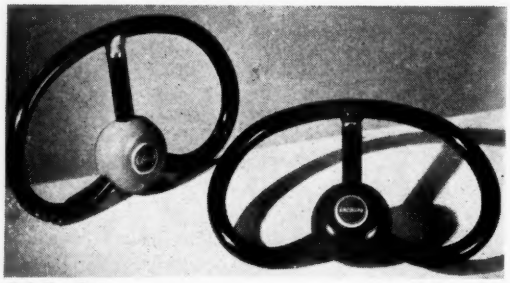

Bakelite Corp.

Vinylite Plastic Slip-Free Grips

Airplane Control Wheel Grips

A STEADY, slip-free grip for precision air maneuvering of Cessna and Ercoupe civilian aircraft is assured by new sturdy control wheels made of Vinylite plastic, a product of the Bakelite Corp. The wheels consist of a metal frame covered with the extruded Vinylite plastic tubing, which is said to be resistant to perspiration and grease, non-inflammable, long wearing, and pleasant to the touch. This flexible tubing assures the pilot of a firm grip on the control wheel and adds new styling to the airplane interior. Produced in a wide variety of permanent colors, the tubing blends harmoniously with virtually all cabin designs. The wheels are manufactured by the Richard M. Decker Co., and the tubing is extruded by Sandee Mfg. Co.

Floor Matting for Industrial Use

THE Lowenthal Co., 188 W. Randolph St., Chicago, Ill., has introduced a new type of floor matting for industrial use which consists of a rubber-link floor covering similar to the small door mats that proved so practical and durable in home use. It is claimed that actual tests have proved that workers standing on the new "L-CO" floor matting are able to stand much longer with much less fatigue. It is further claimed that the new matting provides lifetime, virtually indestructible, skidproof and shock-absorbing underfooting. Restaurants say that dish breakage is noticely reduced when the new matting is used in their kitchens, and it is expected to replace the old-

Lowenthal Rubber Link Mat

HEAT is the enemy of RUBBER

Monsanto lampblack cuts HEAT "BUILD-UP"

Wise manufacturers of rubber take every precaution to reduce heat "build-up" in their product. That's why they are using Monsanto Lampblack No. 10 . . . for both synthetic and natural rubber.

This formulation of Monsanto Lampblack has demonstrated *definite superiority in smoothness . . . with far less friction, less heat "build-up" . . .* especially where flexing is a factor. (For example: in an automobile tire it is estimated that the rubber is flexed 15 million times in 20,000 miles!) Monsanto Lampblack No. 10 has a maximum degree of purity and carbon content (Typical analysis: Free Carbon, 99.29%).

You may have samples and additional technical information about using Monsanto Lampblack in your manufacture by addressing: MONSANTO CHEMICAL COMPANY, 30 Rockefeller Plaza, New York 20, N. Y.

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A LONG ESTABLISHED AND PROVEN PRODUCT

THE CARTER BELL MFG. CO.
SINCE
CARTER BELL PRODUCTS
1903
SPRINGFIELD, NEW JERSEY

fashioned duck board which is found in restaurants, bars, fountains, etc.

The new "L-CO" matting is sold by the square foot in any size to meet the user's specifications. It can be custom fitted to odd-shape rooms and is available in special-purpose mats for work areas or as a wall-to-wall floor covering.

U. S. Rubber Outdoor Wading Pool

Children's Wading Pool

A NEW type of outdoor wading pool for children is now being delivered by the United States Rubber Co., Rockefeller Center, New York, N. Y. Made of heavy duck fabric coated on both sides in color with the special synthetic rubber compound developed by the company for use in war production of water storage tanks, the pool has no stitching at any point, and the seams are permanently sealed by vulcanization. The pool is said to be not only completely watertight, but sunproof, rotproof, acidproof, oilproof, and highly resistant to abrasion and puncturing. If punctured, the pool can be repaired in the same way as the inner tube of a tire.

The pool, 68 inches in diameter and 15 inches high, comes completely equipped with instructions for quick assembly. Equipment includes octagonal wooden seat frames and support posts that are specially treated. The pool is colored red on the outside and green on the inside. Assembly or disassembly of the pool is said to take only a few minutes, and it may be filled quickly by means of a garden hose. Its collapsible construction enables it to be packed compactly and easily transported by car. Because of the coated fabric construction, it is easy to keep clean and sanitary. For ease in draining and cleaning, an outlet is provided near the bottom.

FOR LOW HEAT BUILD-UP USE PHILBLACK A

FOR FURTHER DETAILS, SEE AD ON PAGE 4

ACCELERATORS
PLASTICIZERS
ANTIOXIDANTS

A Complete Line of Approved Compounding Materials

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

AKRON OHIO, • LOS ANGELES, CALIF. • CHICAGO, ILL.

MAGNESIA

MAGNESIUM CARBONATE

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MAGNESIUM OXIDE

EXTRA LIGHT

The Original Neoprene Type.

A supreme quality product for the rubber trade. Extremely fine state of division. Improves storage stability and resistance to scorching. A curing agent unexcelled for increased modulus, greater resilience, reduced heat build-up, lower compression set and retention of tensile strength during heat service.

LIGHT

A high quality product of greater density than "Extra Light," but high in MgO and low in impurities. An excellent value for many uses.

MEDIUM

A good value. Very active. High Magnesia content, low in impurities. Medium density.

HEAVY

All types can be furnished. Specially ground to meet the exacting Code Pigment Specifications of the Rubber Trade. Unground types for chemical uses.

PACKAGES— Specially designed to protect contents from moisture and air. Corrugated cartons with special asphalt laminated moisture-proof liner, and inner paper liner. Five-ply multi-wall bag, including special asphalt laminated moisture-proof liner.

Special Service for All Requirements of the Rubber Trade

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Specialist in Magnesia

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FAR EAST

INDO-CHINA

Efforts to get the Indo-China Rubber Research Institute (known as the I.R.C.I.) in full swing, immediately struck two important snags: lack of trained European scientific workers and a lack of laboratory equipment. The French Rubber Institute has undertaken to solve the problems involved, a task it is successfully handling. Already three agricultural engineers have arrived in Indo-China, and five more are expected shortly. The work of these men will center on phytopathology, experimental agriculture, selection, and genetics, latex and rubber chemistry and technology, among others. In the course of the year several more young men, now being trained by the I.F.C. (French Rubber Institute) are expected to be ready to take up their duties at the local experiment stations.

Complete equipment of the local laboratories is expected to require several months at least. But much work in this direction has already been done, and it is considered that it will not be too long before the I.R.C.I., which already disposes over five buildings and more than 1,000 hectares of experimental plantations, will also have a highly qualified scientific staff as well as laboratories furnished with the most-up-to-date apparatus adapted for the latest technical requirements.

In his report at the meeting in Saigon on March 14, 1946, the president of the Indo-China Rubber Planters' Association reviewed the history of rubber production there and discussed the present status of the local industry.

Indo-China began to plant rubber at a comparatively late date, and in 1910 the total area under rubber was only 5,000 hectares, with output of only 75 tons. Progress was relatively slow, and interest in large-scale planting did not develop until 1925. By that time the other important rubber growing centers in the Far East had accumulated much valuable experience, and French planters were able to benefit by the advances made elsewhere in *Hevea* cultivation, especially in the then rather new technique of bud-grafting. By 1939, Indo-China had a rubber area of 132,600 hectares, of which more than 40% was planted with the best known clones; production for that year reached 65,200 tons.

When the war broke out in 1939, the rubber industry in Indo-China represented an investment of 242,658,000 piasters[1] and employed 88,400 workers including coolies and office workers and staff members. In that year rubber after rice, was the most important export product of the country, with a value amounting to 27.4% of the total value of all exports from the country for the year. At that time estimates of Indo-China rubber production in the next eight years, including 1939, were as follows:

Tons	Year	Tons	Year
63,918	1939	85,011	1943
69,949	1940	89,500	1944
75,678	1941	94,500	1945
80,703	1942	85,011	1943

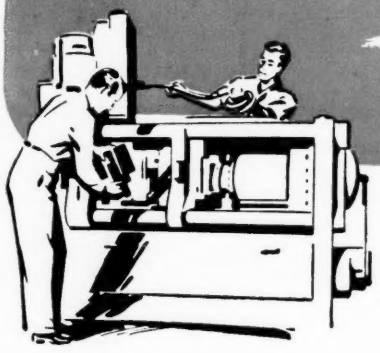
As we saw above, the 1939 estimate was exceeded, and those for 1940 and 1941 were also largely realized. But after the entry of the Japanese, production fell rapidly from year to year. In 1942 total outputs came to 75,167 tons; in 1943, 74,792 tons; in 1944, 61,389 tons; and in 1945, 12,000 tons. Compared with the estimated production for those years, the total shortage comes to 126,366 tons. Over and above this, however, must be considered the loss of future crop, estimated at 80,000 tons, that would have been obtained from the young plantations that were destroyed or damaged during the Japanese occupation.

[1] The Indo-China piaster is normally equal to 39¢ U. S. currency.

CEYLON

Customs figures for crude rubber exports from Ceylon during 1938 to 1945, inclusive, follow: 1938, 51,171 tons; 1939, 60,243 tons; 1940, 88,168 tons; 1941, 90,360 tons; 1942, 111,929 tons; 1943, 98,115 tons; 1944, 100,081 tons; and 1945, 95,871 tons. The contrast between the admittedly low prewar shipments and those for the war years is striking and tends to

RELEASE MOLDED RUBBER *Economically*



USE COLITE CONCENTRATE... *A High Quality Concentrated Liquid Mold and Mandrel Lubricant*

- Results in a shiny, satin-like finish.
- **Never** builds up on the molds.
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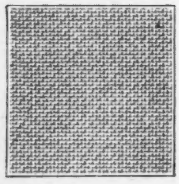

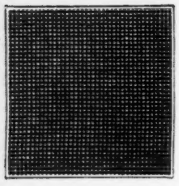

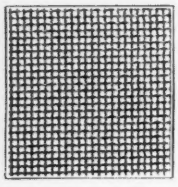

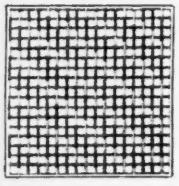

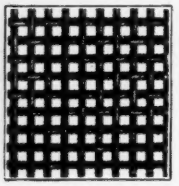

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confirm the opinion of those who held that Ceylon was not capable of producing more than about 100,000 tons a year and that however much local growers might have wanted to comply with the urgings of the Allies at the time, the island could not reasonably have been expected to produce much more than actually was harvested.

Sir Oliver Goonetileke, Financial Secretary for Ceylon, recently left for England to continue his discussions with the British Government concerning terms for renewal of the United Kingdom bulk purchase agreements for Ceylon rubber and tea, which expired in September. It was hoped here that Sir Oliver would be able to obtain an agreement to a reasonable fixed price for rubber and tea for the next five years, as has already been approved for coconuts.

At the last meeting of the Research Board of the Ceylon Rubber Research Scheme, it was announced that the director, T. E. H. O'Brien, had stated his intention of retiring on March 31, 1947. Immediate steps are to be taken to appoint a successor, and a committee has been set up to recommend a suitable salary scale.

NETHERLANDS INDIA

Reports of rubber production in Netherlands India continue somewhat confusing and to that extent reflect the conditions in these territories which are still more or less unsettled, especially in Sumatra, in prewar days the main supplier of rubber in the Dutch possesssions. However, judging by news emanating from different sources, rubber outputs are increasing in several parts of Indonesia, and it is understood that in Borneo there are indications that rubber exports will exceed the highest prewar figure within a few months. A report in a British paper states that shipments of rubber from Celebes are expanding rapidly; this is indeed news, for to this writer's recollection Celebes never produced rubber in any quantity worth mentioning, if indeed it produced any at all.

The government is said to be taking steps to improve the quality of native rubber produced in Banka; a remilling factory is to be restored and also various smoke houses; while additional smoke houses are to be built; advice on sorting, packing, and shipment will be given native exporters.

Netherlands India authorities have imposed an export tax on rubber which amounts to 20 Dutch cents per kilogram. To evade this tax, considerable amounts of rubber are being smuggled to Malaya, to the great concern of the Dutch who thereby are deprived of much needed revenue, and there seems to be little the Dutch can do to stop this smuggling, for the chief center of these activities is Riouw, which includes not only the province of Indragiri in Sumatra, but also the Riouw Archipelago, a group of small islands between Sumatra and the Malay Peninsula. The Dutch are said to find it extremely difficult to combat smuggling from these islands. Riouw exported about 7,000 tons of native rubber annually before the war.

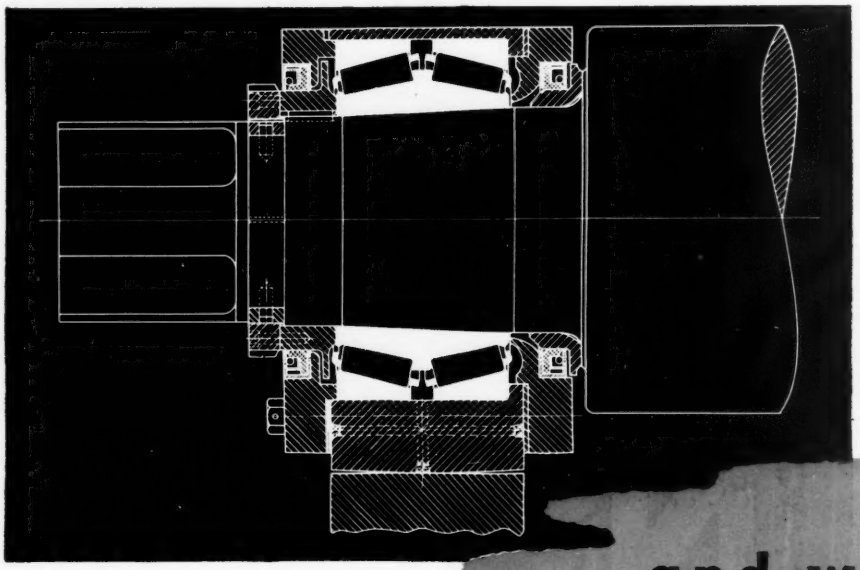
From Singapore it was reported that Dutch warships had detained 18 Chinese vessels carrying goods from Indonesia. No explanation for this step has yet been published, but in view of the fact that the cargoes, valued roughly at $16,000,000 (Straits currency), were said to have consisted mainly of sugar and rubber, it is likely that the Dutch may have suspected that smuggled rubber was on the ships.

SIAM

It is reported from Bangkok that 3,000 tons of rubber are on the way to the United States from Siam, this being the first shipment under the authority of the Combined Board appointed to handle rice, rubber and tin. The dollar credits Siam obtained by her exports to the United States are to be used toward the importation of various types of American goods including tires.

Local opinion seems to be that only relatively small amounts of rubber can be expected from Siam since the plantations suffered considerably from neglect during the war years.

PUT THIS BEARING ON YOUR *Calender Rolls*



and watch performance improve

With the new Timken DIT Type Balanced Proportion Bearings on the roll necks of your rubber and plastics calenders you will get greatly increased roll neck rigidity with minimum roll deflection under all load conditions because these bearings make possible larger, stronger roll necks plus maximum radial, thrust and combined load capacity.

Result, accurate product control; lower operating cost; reduced maintenance; extended equipment life.

Note the simplicity of the bearing mounting; this makes it much easier to assemble the bearings on the roll necks and to remove them when necessary.

For specific information covering the application of Timken Balanced Proportion Bearings to your calenders consult the calender builder or our engineers. The Timken Roller Bearing Company, Canton 6, Ohio.

LOOK for the trade-mark "TIMKEN" on every bearing that goes in your equipment.

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Stabilizes Vinyl Chloride Plastics and coatings against heat and exposure discoloration.
Yields
Transparent
Colorless
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MALAYA

The British territories in the Malay Peninsula formerly known as British Malaya have been regrouped into a Malayan Federation and the Crown Colony of Singapore. The Malayan Federation includes the former Federated Malay States, Perak, Selangor, Negri Sembilan, and Pahang; the former Unfederated Malay States, Johore, Trengganu, Kelantan, Kedah, and Perlis; and the Settlements of Penang and of Malacca. The Crown Colony of Singapore includes the Island of Singapore, the Cocos or Keeling Islands, and Christmas Island.

Penang Island is once more a free port, and all goods except liquor, tobacco and petroleum products may now be imported duty-free again. All exports are exempt though rubber is apparently an exception, and the excise tax of four Straits cents a pound on rubber exported from the rest of the Malayan Federation, also applies to rubber exported from Penang unless the duty was already paid elsewhere in the Federation, or the rubber was imported from outside Malaya. In Singapore a rate is charged under the Rubber Estates Assessment Ordinance. The cess of ¼-cent a pound formerly levied in connection with the International Rubber Research Scheme has been suspended.

Rubber production in Malaya is proceeding at an unexpectedly rapid rate, according to the speech F. J. Kemlo, chairman of the Singapore Chamber of Commerce Rubber Association, made at the first annual meeting of the organization to be held in five years. He estimated that native rubber production in the Malay Peninsula was already at 100% of capacity, with estate production of 50%, giving a potential monthly output of at least 35,000 tons for Malay alone.

The allocation under the Anglo-American rubber agreement of 50,000 tons of rubber to the United States for the third quarter of this year was filed almost overnight, Mr. Kemlo stated. At one time the collapse of the internal Malayan rubber price seemed imminent because the trade was unable to absorb further supplies, Mr. Kemlo further revealed. Urgent representations were made to America, he added, which agreed to buy 45,000 tons of rubber for the four.h quarter, to be shipped in August and September.

Imports of rubber into Malaya from Netherlands India are assuming substantial proportions. May shipments from Sumatra, valued at £700,000, consisted chiefly of rubber, and during July, 21,615 long tons of rubber reached Malaya from Netherlands India.

BURMA

Burmese rubber plantations have apparently fared less well than those in some of the other Far Eastern countries occupied by the Japanese, latest reports indicate. The Japanese tapped the trees here to obtain rubber for distillation into fuel and seem to have slashed the trees so severely that it is expected it will take many years for the restoration of sufficient bark to permit regular tapping again. No rehabilitation work has been started here yet on the European owned estates, as commercial firms have not yet been permitted to return to Burma.

Burma has always been one of the smaller producers of rubber in the Far East, and the yield per acre has been on the low side. In 1939-40 the output came to about 12,000 tons, most of which went to India and the United States, leaving 1,275 for shipment to Great Britain.

AFRICA

Rubber Industry in the Belgian Congo

Before the plantation rubber industry began to get into its stride, Belgian Congo was an important source of wild rubber

contributing at one time 10% of total world outputs of rubber. Exports of wild rubber from this territory dwindled rapidly after a time and finally ceased; by 1940 rubber exports from Belgian Congo consisted of only 700 tons of *Hevea* rubber, and before long rubber production ceased completely. When the invasion of the Far Eastern rubber centers by the Japanese cut the Allies off from their main sources of supplies, Belgian Congo was one of the countries appealed to for rubber.

Immediately a concerted effort was made to answer the appeal, with the government in full control. Collection of wild rubber had to be completely reorganized, and the extension of *Hevea* plantations rushed. Natives were obliged to give up a certain number of days to the production of rubber, and to encourage them prizes in cash or goods were offered to the best rubber collectors. In 1942 a rubber commission was appointed in Leopoldville to examine all measures likely to increase outputs, and a special section of the Department of Agriculture was formed to be devoted to rubber production. An agency was set up which alone was empowered to buy and sell rubber at fixed prices.

As a result of combined efforts and initiative, exports of wild rubber began to increase rapidly, from 323 tons in 1941 to 6,210 in 1943 and 9,611 in 1944; 1945 saw a drop of 3,552 tons.

At the same time the National Institute of Agricultural Research in Belgian Congo pursued its scientific investigations and work on *Hevea* selection. It lost no time in supplying existing plantations with suitable planting material. Altogether the Institute distributed about 5,000,000 clonal seeds, 45,000 budded stumps, and 25,000 meters of budwood. In addition it also provided natives with about 65,000,000 ordinary seedlings, for close planting.

Various intensive tapping systems were tested, and apparently the least harmful to buddings six and seven years old proved to be the S/2 2d/3 (one-half spiral cut two days out of three); this system was also applied to all young *Heveas* when they had a girth of 40 centimeters at one meter from the ground; a more intensive system, the 2 S/2 d/3 (two half spiral cuts every third day) was introduced for old stands of ordinary seedlings, and condemned stands were slaughtertapped.

Hevea was not planted by the natives prior to 1937, but thereafter a program for *Hevea* cultivation was worked out for them, and by the end of 1942 native *Hevea* rubber grown on fallow land covered an area of 14,000 hectares, with 1,600 plants to the hectare. This close planting was advocated to permit very early tapping, an urgent necessity under the conditions prevailing at the time. Besides at the same date normal *Hevea* plantations covered 3,000 hectares.

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It is noted that an important financial group has set up dense plantations of *Hevea* with about 5,000 plants per hectare in a district known as one of the least favored both from the point of view of density of population and transportation facilities.

A number of companies now have large acreages under rubber in Belgian Congo; altogether there are now 196 rubber plantations of all sizes here. The following table demonstrates the development of *Hevea* planting in recent years:

AREAS UNDER *Hevea* (IN HECTARES)

Year	European Plantations	Native Plantations	Total
1939	10,370	249	10,619
1940	13,765	1,153	14,918
1941	17,626	2,099	19,725
1942	24,707	16,161	40,868
1943	35,961	26,319	62,280
1944	44,000	28,000	72,000

Hevea exports during eight months of 1942 came to 746 tons; in 1943 the total was 1,764 tons; in 1944, 16,676 tons, and during the first six months of 1945, 1,081 tons.

Tire Needs and Production

The tire situation in South Africa in the first half of 1946 was reportedly still acute, and it is still necessary to maintain control on tire distribution. Production has been increasing, and actually the number of tires available to the public would be more than ample to cover normal prewar replacement needs. But present needs are far above normal requirement.

Reports from South Africa indicate that the problem confronting the local tire manufacturers now is not so much the shortage of raw materials as of plant. Factories have to operate to capacity 24 hours a day and are producing about 50,000 tires a month, or about twice the prewar output. Prices of tires have risen markedly since 1939, in some cases more than 50%.

The rubber manufacturing industry seems to be in for a period of rapid expansion, with at least three American subsidiaries taking an important part in the development. There is the Firestone S.A. (Pty.), Ltd., at Port Elizabeth, which has been extending present installations and hopes, when this work is completed, to be able to increase daily output of passenger and truck tires from 1,400 to 2,000 tires, with 1,000 employes and working three shifts. The output of inner tubes is already said to be 2,000 units daily. It is planned to use rayon cord in all giant-size tires, it is learned.

The Goodyear company was expected to begin operations at its new Uitenhage factory in the beginning of August. Reports have it that this factory is larger than any other Goodyear overseas enterprise.

The General Tire & Rubber Co. is understood to be looking for a suitable site in the Transvaal, near Johannesburg, where it will erect a tire factory with initial annual capacity of 75,000 tires. It is understood that the American company is to form a new subsidiary with capital of £1,000,000, which will not only supply the local market, but will seek to develop export trade with the Middle East and all of Africa.

Other Developments

A new coagulation process is said to have been successfully demonstrated in Johannesburg by two South Africans, Torr and Gericke. No acid was used, but instead, alternating and direct electrical current was passed through latex which had been poured in a shallow tank. Within 15 minutes, a spongy mass was obtained that could be removed from the coagulating tank, and was then washed and rolled into a sheet of uniform quality, it is claimed.

In the Transvaal an inventor has developed a method of producing from old tires, seamless sandals said to be light (not much heavier than tennis shoes), yet durable and considerably cheaper than ordinary rubber shoes. These sandals are intended primarily for native miners, but farmers and fishermen are also expected to find them useful. At present the footwear has not enough finish to appeal to the local European market, but it is believed that it has possibilities and that it could, for instance, be produced in different colors for women's sportwear.

Exports of wild and plantation rubber from French Africa increased markedly during 1944 and 1945 as compared with the prewar years 1938 and 1939. French West Africa, which shipped 659 tons in 1938 and 523 tons in 1939, exported 3,440

tons in 1944 and 2,944 tons in the first 11 months of 1945. Cameroons exported 1,437 tons in 1938 and 2,049 tons in 1939, against 3,217 tons in 1944 and 3,364 tons in the first 11 months of 1945. The 1945 Cameroon exports included 2,119 tons of plantation rubber; the amount of plantation rubber included in the other years mentioned are not separately stated. From French East Africa rubber exports came to 1,037 tons in 1938, and 1,069 tons in 1939, compared with 3,537 tons in the year 1944 and 2,775 tons in the first 11 months of the year 1945.

HOLLAND

On the Amsterdam Stock Exchange rubber shares were quoted again this past June for the first time in almost two years, with prices reportedly strong.

The Netherlands Government proposes to import from the United States in 1946 goods and commodities to a total value of $340,000,000, an embassy report from the Hague states. A total of $44,700,000 had already been allocated to Netherlands importers and agents up to April 1, 1946, and the allotment for rubber to that date had been $2,406,000. The total amount allocated for rubber goods during 1946 is $12,100,000, and it is planned to buy during the year 250,000 automobile tires, valued at $10,000,000.

The acute shortage of steel wire for cycle tires and the inability as yet to import more than a small part of present requirements or to obtain immediate delivery of machinery from abroad to produce wire locally is said to be keeping down the monthly output of cycle tires to a fraction of actual capacity. Dutch cycle tire factories are now producing less than 170,000 tires monthly; whereas they could in the aggregate have a monthly output of 400,000 to 500,000 tires. It has been possible to import from abroad between 50,000 and 80,000 tires, but the cycle tire situation is not expected to be materially relieved until the arrival of 500,000 Goodrich tires from America.

Reports state that the local industry disposes of adequate supplies of crude rubber to cover immediate needs. By the end of June about 900 tons of rubber had been received from Netherlands India.

Among the new articles it is proposed to manufacture in Holland are arch supports made from a synthetic resin. The resin and all other raw materials required for this purpose will be made locally, and it is expected that production will come to 250,000 pairs a year, and will leave a surplus for export.

Coating Machine

(*Continued from page* 112)

ing head, which is an air blade fitted with a slot, planes off the amount of coating not needed, and the amount of coating left on the surface is uniformly distributed. No roll, doctor, or brush touches the coated surface after the coated web passes in front of the "Microjet" air blade. Thus the coating is undisturbed and free of marks and scratches of any kind.

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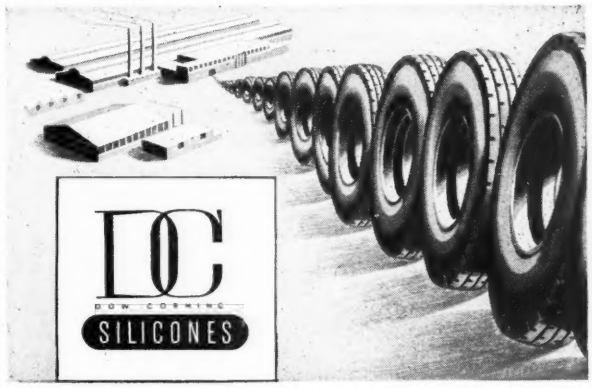

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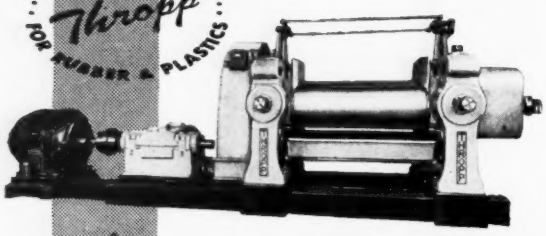

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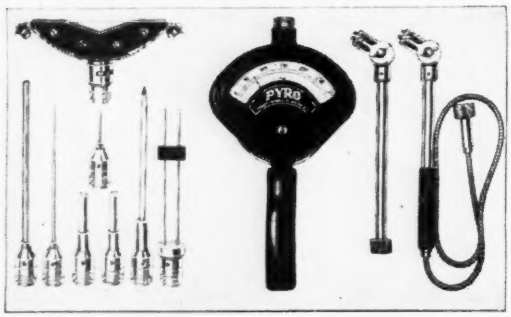

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Editor's Book Table

BOOK REVIEWS

"Colloids—Their Properties and Applications." A. G. Ward. Interscience Publishers, Inc., 215 Fourth Ave., New York 3, N. Y. Cloth, 4¾ by 7¼ inches. 138 pages. Price, $1.75.

This volume is an attempt to present an elementary discussion of the field of colloids. The author, a former Scholar of Trinity College, Cambridge, England, has succeeded in writing a simple, readable book which adequately covers the fundamental principles of the subject. By its very nature there is little detail presented, and the text is rather generalized. In addition many of the new developments in the field are either omitted or briefly noted, a pardonable lapse in view of the rapid growth of colloid science. No references to the literature appear in the book although the authors of the research referred to are usually named. A bibliography appendix gives suggested reading, both elementary and advanced, for the fields of physical chemistry and colloids. The book also contains a rather comprehensive index.

The text is divided into three main sections. The first section, "The Nature of the Colloidal State," contains five chapters, respectively entitled: "Introduction;" "The Atomic Structure of Matter;" "Surfaces;" "The Colloidal State;" and "The Experimental Study of Colloidal Particles." Section two, "The Colloidal Systems," consists of five chapters, with titles as follows: "Lyophobic Sols (Suspensoids);" "Lyophobic Sols (Emulsoids);" "Gels and Pastes;" "Emulsions and Foams;" and "Dusts, Smokes and Fogs." "Colloids in Industry and in Living Matter," the final section, comprises seven chapters, entitled: "Rubber and Synthetic Rubber;" "Cellulose and Related Substances;" "Proteins;" "Clay;" "Paints;" "Lacquers, Enamels and Varnishes; Detergency;" and "Colloids and Living Matter."

Of special interest is the chapter on rubber and synthetic rubber. Here, again, the approach is rather general, and the subject matter of essentially prewar vintage. There is, however, a simplified review of natural latex, its handling (including stabilization, creaming, and coagulation), and methods of fabrication. The compounding of dry rubber is also briefly reviewed. The section on synthetic rubbers is brief and rather badly out of date, although mention is made of Buna S, Perbunan, neoprene, and "Thiokol."

"German for the Scientist (Chemist and Physicist)." Peter F. Wiener. First American edition with additional sections and forward by Paul Spoerri. Published by Chemical Publishing Co., Brooklyn, N. Y. 1946. Cloth, 5¼ by 7½ inches, 238 pages.

The realization is becoming widespread today that one can learn to read a foreign language without first spending years of painful study of its grammar. Equipped with the fundamentals of the grammar of the language, a working vocabulary, and a good dictionary, the scientist or advanced science student should experience no special difficulty in reading foreign language text—provided he is sufficiently interested to summon the necessary concentration.

It is from such considerations that Dr. Wiener, formerly tutor in German in the University of London and now Modern Language Master at Rugby School, compiled the present handbook. It is divided into four parts. Part one contains an outline of the necessary grammar including notes on special difficulties and hints on how to avoid them. Parts II and III contain lengthy passages from scientific literature (chemistry and physics) arranged in order of difficulty. In Part IV are found the full, but not always literal translations of the respective passages, permitting students to check up on their own translations. A vocabulary completes the whole.

The little volume should prove most useful not only to beginners in the study of German, but also to those who once knew the language, but whose knowledge has become rusty through disuse. Might one suggest, however, that the table of German irregular verbs would be more valuable if the policy observed in a few cases of giving additional meanings of a word were followed more consistently? For instance, *Quellen* is translated "gush," though the chemist is more likely to come across the word in its meaning to "swell." "Induce" for *bewegen* might prove confusing without the primary meaning "move"; "bleach" is a closer and more useful translation for *"bleichen"* than "fade."

"**Cotton and Rayon Textile Companies:** An Analysis of Comparative Investment Values and Opportunities." E. W. Axe & Co., Inc., 730 Fifth Ave., New York 19, N. Y. Paper, 8¼ by 11¾ inches. 98 pages. Price 50¢ to public libraries and non-profit institutions; $1 to all others.

This is the third of a series of studies on the textile industry completed by the Axe research department. The usual division of the industry into cotton, wool, rayon, and silk manufacturers has been abandoned in this study because of changes in the industry itself whereby the modern manufacturer tends to use more than one kind of fiber.

The study includes two charts and 25 tables giving the statistical bases on which the outlook for the industry and 49 individual companies is appraised. The survey includes brief discussion of and statistics on 15 individual companies whose common stocks appear to offer good investment values at present prices. Besides these chapters on specific companies, there are others on the inventory situation, foreign cotton consumption, effect of inflation, domestic and export demands, effects of government regulations, the marked trend toward integration, the importance of management, improved financial and physical condition, labor costs, new fabrics, and the trend toward brand names.

NEW PUBLICATIONS

"Santicizer 160." Technical Bulletin O-D-110. Monsanto Chemical Co., St. Louis, Mo. 13 pages. This bulletin gives the physical properties of a new plasticizer designed especially for use in vinyl resins, but also compatible with a wide variety of other resins. Data are also presented on compatibility limits, volatility, and effect of the plasticizer on low-temperature flexibility, abrasion resistance, oil and moisture resistance, and heat stability in many resin formulations.

Publications of the Gillette Tire Division of United States Rubber Co., New York, N. Y. **"Gillette Farm Tire Reference Book."** 69 pages. This booklet lists farm tractor and implement tire sizes both for new equipment and replacement, and the selection of tire sizes for steel-to-rubber changeovers. There is also a section on anti-freeze solution as well as a general discussion of the company's production and facilities. **"Get Set with Gillette."** 20 pages. This jobber-dealer franchise presentation describes the complete merchandising program for the company's entire line of tires and accessories. **"Gillette Tires Advertising and Merchandising."** 24 pages. This booklet is designed to help jobbers and dealers improve store identification and organize sales campaigns. Subjects discussed include neon signs, window displays, billboards, advertising service, budget manuals, and salesmen's kits. **"Gillette Tires and Allied Products Reduce Tire Mileage Costs."** 48 pages. This bus and truck tire manual gives detailed information on tire types and their application to specific uses, loads, speeds, and inflations. Construction of tires is illustrated, and other subjects include Butyl tubes, rim data, valve dimensions, service recommendations, and correction of mismatched duals.

"From the Research Laboratory to the Armed Forces." Mellon Institute of Industrial Research, University of Pittsburgh, Pittsburgh, Pa. 40 pages. This booklet gives the text of a series of six radio talks presented by the Institute during the past April and May. Talk III, by Charles F. Winans and entitled "The Triumph of Synthetic Rubber," gives a general review of the wartime accomplishments of the synthetic rubber industry.

"Firestone Aircraft Tire and Accessories." Firestone Tire & Rubber Co., Akron, O. 36 pages. This wholesale catalog for retail airport stores covers advertising helps, batteries, brake lining, fabrics, finishes, flight accessories, hardware, jackets, plane accessories, polishes and cleaners, propellers, radio equipment, steerable tailwheels, stencils, display equipment, tires and tubes, and wheel-brake units. Illustrations are shown of the products available, together with purchasing data.

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"Witco Lead Oleate." Technical Service Report No. R-2, July 29, 1946. Witco Chemical Co., New York, N. Y. 4 pages. Illustrations and test data are presented in this bulletin showing the effect of lead oleate in increasing the tubing smoothness of GR-S. Data are also presented to show that lead oleate reduces the scorching tendency of thiuram-accelerated stocks, and that stocks containing lead oleate are superior to those containing litharge and stearic acid combinations.

"Comparison of GR-S-10 and GR-S with Various Fillers." Technical Bulletin No. 2. Hercules Powder Co., Wilmington, Del. 2 pages. This bulletin gives experimental data on physical properties obtained in compounded stocks of GR-S-10 and GR-S using various loadings of calcium silicate (Silene EF), both with and without the use of Staybelite Resin and coumarone-indene resin softeners.

"Marbon S and S-1 Resins in Shoe Sole and Heel Stocks." Marbon Corp., 1926 W. Tenth St., Gary, Ind. August 8, 1946. 4 pages. This bulletin gives tabulated data on the physical properties obtained by the use of Marbon resins in 12 formulations for shoe sole and heel stocks. Properties listed include modulus, tensile strength, elongation, tear strength, hardness, abrasion and flexing resistance obtained with various curing cyles.

"Research Leads the Way." The B. F. Goodrich Co., Akron, O. 8 pages. This illustrated booklet describes the company's new research center now under construction at Brecksville, O., with drawings of the exterior, the lobby, conference room, laboratory units, and library.

"Rubber from Oil." Stanco Distributors, Inc., 23 Broadway, New York 4, N. Y. 28 pages. This booklet consists of three articles reprinted from *The Lamp*, describing the contributions of Standard Oil Co. (N. J.) to the government's rubber program. The articles cover the history, development, growth, and present status of Perbunan and Butyl rubbers and the development and production of butadiene.

"Sharples Synthetic Organic Chemicals." 14th Edition, June, 1946. Sharples Chemicals, Inc., 123 S. Broad St., Philadelphia 9, Pa. 72 pages. This booklet lists the company's commercial products and many products now in the semi-commercial or laboratory stage of development. More than 150 synthetic organic chemicals are described, their properties given, and a brief discussion is presented of their uses and applications.

"DC 702 and DC 703, Silicone Fluids for Use in High Vacuum Diffusion Pumps." Dow Corning Corp., Midland, Mich. 8 pages. After a discussion of diffusion pumping, this bulletin covers chemical structure of the two silicone fluids, their forepressure, ultimate vacuums obtainable through their use, pumping speeds, recovery time, and the effect of metals on the fluids. Illustrative charts and diagrams also appear.

"Rotameters—Flow Rate Indicating, Recording, Controlling, Totalizing Meters." Bulletin No. 45-B. Fischer & Porter Co., Hatboro, Pa. 8 pages. After an initial section on principles of the rotameter, the bulletin describes and illustrates the company's line, giving design features and other pertinent information. Also included is a chart showing recommended rotameters and materials of construction for many different types of chemical service.

"Vulcanizing Dispersions for Use in Synthetic and Natural Latices." Booklet No. 16A. August 15, 1946. R. T. Vanderbilt Co., 230 Park Ave., New York 17, N. Y. 8 pages. This booklet lists the company's standard vulcanizing dispersions and dispersions of individual materials, giving the composition of each and grouping the dispersions according to the type of latex in which they are to be used.

"Where to Find Information on the German Chemical Industry." German Industry Series. Part I. L. Wilson Greene, Baltimore, Md. Price, $1. 40 pages. The bibliography presented herein is divided into two main sections: the first, a list of published articles, and the second, a list of selected reports obtainable from the Office of Technical Services. The second section is classified according to industry, with the rubber and plastics industries well represented. A comprehensive subject index is included.

"Carson Electronic Micrometers." Carson Micrometer Corp., Newark 2, N. J. 4 pages. Described are the company's four redesigned models of electronic micrometers. Photographs appear together with information on operating principles and construction and a discussion of the uses and advantages of these instruments.

"Shaping a Better Future—The Printer's Die Cutting Manual." Accurate Steel Rule Die Mfrs., New York 10, N. Y. 24 pages. Information is given herein on a process of die cutting suitable for use on rubber, plastics, and many other metallic and non-metallic materials. Illustrations of die cut products are included together with detailed instructions on cutting procedures.

Publications of Hercules Powder Co., Inc., Wilmington, Del. **"Zinc Oxide."** Technical Bulletin No. 3. 2 pages. This bulletin gives a comparison of GR-S with GR-S-10, showing the effect on properties of the vulcanizates obtained by using varying loadings of zinc oxide in formulation containing no softener and in those containing Staybelite Resin or Cumar MH2½ as softeners. **"Comparison of GR-S-10 and GR-S with Various Fillers."** Technical Bulletin No. 4. 2 pages. Given are data to show effect on properties of the vulcanizates with varying loadings of precipitated calcium carbonate. **"Comparison of GR-S-10 and GR-S with Various Fillers."** Technical Bulletin No. 5. 2 pages. This bulletin is similar to No. 4 except that varying loadings of fine thermal black are used in place of calcium carbonate. **"Age Resistance of GR-S-10 *versus* GR-S."** Technical Bulletin No. 6. 2 pages. Data are given on the effect of hydrated alumina in improving the age resistance of non-black stocks compounded without softener, and with Staybelite Resin or Cumar MH2½ as softeners. Properties are shown both for air aged and oven aged vulcanizates. **"Age Resistance of GR-S-10 *versus* GR-S."** Technical Bulletin No. 7. 2 pages. This bulletin is similar to No. 6 except that calcium silicate is used in place of hydrated alumina. **"Rosin Rubber**—The Story of Hercules Dresinate 731." 8 pages. This illustrated bulletin describes Dresinate 731, its use in the preparation of GR-S-10, and the uses and advantages of GR-S-10. Data compare GR-S-10 with GR-S in unsoftened compositions using various fillers.

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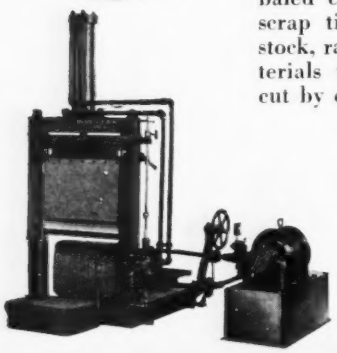

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IMPULSE STEAM TRAP

"1946 Industrial Developments and Commercial Conditions in the Kingdom of Egypt Relative to Patent, Design and Trade Mark Matters." F. Lysaght. Lysaght & Co., Cairo, Egypt. 8 pages. This pamphlet discusses Egypt with regard to geography, area and population, economic changes, industrialization—inventions aand designs, imported goods—trade marks, patent, design and trade mark laws, and currency —weights and measures.

"—And Sudden Death." J. C. Furnas. Industrial Accident Prevention Associations, 600 Bay St., Toronto 2, Ont., Canada. 8 pages. **"List of Inspected Electrical Equipment.** May, 1946" and **"Bi-Monthly Supplement to All Lists of Inspected Appliances, Equipment, Materials.** June, 1946." Underwriters' Laboratories, Inc., Chicago 11, Ill. 450 and 54 pages, respectively. **"Cotton Production in the United States.** Crop of 1945." Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. 38 pages. Price 10¢. **"The Geiger-Mueller X-Ray Spectrometer."** F. G. Firth. North American Philips Co., Inc., 100 E. 42nd St., New York 17, N. Y. 8 pages. **"1946 Agricultural Handbook."** The Tire & Rim Association Inc., 2001 First-Central Tower, Akron 8, O. 34 pages. Price 50¢. **"Size and Group Numbering System for Electric Storage Batteries."** Association of American Battery Manufacturers, Inc., 2706 First-Central Tower, Akron, O. 4 pages.

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Dominion of Canada Statistics

Imports of Crude and Manufactured Rubber

	July, 1946		July, 1945	
UNMANUFACTURED	Quantity	Value	Quantity	Value
Balata ..... *lbs.*	2,825	$ 2,375	3,760	$ 9,391
Crude rubber ..... *lbs.*	2,849,280	620,749	1,029,253	439,653
Latex ..... *lbs.*	129,456	38,311	.....	.....
Rubber, powdered, and waste ..... *lbs.*	1,452,300	24,511	475,100	20,301
Recovered ..... *lbs.*	1,804,600	139,066	1,620,200	113,556
Synthetic and substitute. *lbs.*	200,300	42,276	399,800	118,303
TOTALS	6,438,761	$ 867,288	3,528,113	$ 701,204
PARTLY MANUFACTURED				
Hard rubber in rods or tubes. *lbs.*	3,331	$ 4 750	1,504	$ 1,040
Rubber thread, not covered. *lbs.*	2,742	4,256	2,636	4,070
TOTALS	6,073	$ 9,006	4,140	$ 5,110
MANUFACTURED				
Belting	.....	$ 36,134	.....	$ 50,423
Boots and shoes of rubber, n.o.p ..... *prs.*	9,434	7,656	2,408	1,446
Cement	.....	26,944	.....	11,690
Clothing of waterproofed cotton or rubber	.....	1,055	.....	1,558
Druggists' sundries	.....	28,957	.....	24,330
Gaskets and washers.....	.....	16,299	.....	10,320
Gloves ..... *doz. prs.*	1,409	4,052	594	1,990
Golf balls ..... *doz.*	347	1,692	.....	.....
Heels ..... *prs.*	4,510	412	1,850	144
Hose	.....	20,582	.....	40,213
Hot water bottles.....	.....	210	.....	762
Inner tubes, n.o.p..... *no.*	1,029	3,743	159	1,1
Bicycle ..... *no.*	1,907	1,441	579	301
Liquid sealing compound.....	.....	6,125	.....	12,507
Mats and matting.....	.....	38,225	.....	1,742
Nursing nipples ..... *gross*	391	1,525	298	855
Packing, rubber	.....	13.810	.....	21,884
Raincoats ..... *no.*	.....	.....	1	12
Tire repair material.....	.....	6,956	.....	10,180
Tires, pneumatic, n.o.p..... *no*	8,638	183,478	147	13,829
Bicycle ..... *no.*	2,068	4,140	1,438	1,521
Solid for automobiles and motor trucks ..... *no.*	19	523	21	1,133
Other	.....	3 289	.....	1,133
Other rubber manufactures....	.....	190,821	.....	166,907
TOTALS	.....	$ 598,069	.....	$ 376,036
TOTALS, RUBBER IMPORTS	.....	$1,474,363	.....	$1,082,350

Exports of Crude and Manufactured Rubber

UNMANUFACTURED				
Crude rubber, including synthetic rubber..... *lbs.*	1,551,619	$ 293,826	3,599,327	$1,367,407
Waste rubber ..... *lbs.*	1,446,500	26,702	5,101,700	44,135
TOTALS	2,998,119	$ 320,528	8,701,027	$1,411,542
PARTLY MANUFACTURED				
Soling slabs of rubber..... *lbs.*	14,731	$ 3,058	.....	.....
MANUFACTURED				
Belting, n.o.p. ..... *lbs.*	145,085	94,977	114,835	70 935
Belts, fan	.....	6,836	.....	.....
Boots and shoes of rubber, n.o.p. ..... *prs.*	274,646	454,616	296,298	448,677
Canvas shoes with rubber soles ..... *prs.*	146,123	124,592	58,022	54,014
Clothing of rubber and waterproofed clothing	.....	124,980	.....	17,200
Heels ..... *prs.*	82,793	6,492	163,765	23,846
Hose	.....	51,393	.....	65,197
Inner tubes for motor vehicles ..... *no.*	5,934	15,337	27,325	101,481
Soles ..... *prs.*	44,430	6,322	360	55
Tires, pneumatic for motor vehicles ..... *no.*	9,686	180,782	29,714	1,138,342
Other ..... *no.*	391	516	311	4,490
Wire and cable, copper, insulated	.....	145,353	.....	441,879
Other rubber manufacturers..	.....	61,601	.....	233,506
TOTALS	.....	$1,273,797	.....	$2,599,622
TOTALS, RUBBER EXPORTS	.....	$1,597,377	.....	$4,011,164

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Market Reviews

COTTON & FABRICS

NEW YORK COTTON EXCHANGE
WEEK-END CLOSING PRICES

	July 27	Aug. 31	Sept. 7	Sept. 14	Sept. 21	Sept. 28
Futures						
Oct.	32.38	36.25	36.94	36.76	37.15	38.05
Dec.	32.40	36.25	36.97	36.62	37.00	37.88
1947						
Mar.	31.98	36.00	36.81	36.35	36.72	37.63
May	31.68	35.72	36.57	36.15	36.35	37.06
July	31.04	35.05	36.09	35.50	35.81	36.04
Sept.	29.90	33.62	34.88	34.03	34.11	34.08

DESPITE the strong statistical position of the cotton market during September, prices did not rise to the expected peak owing to fluctuations sympathetic with the stock market.

The 15/16-inch spot middling price on September 3 was 36.95¢ per pound. It rose to 37.79¢ on September 7, but fluctuations following the stock market brought prices down to 36.74¢ a pound September 10, the low for the month; however on September 30 prices were driven to the high for the month of 39.06¢ a pound.

Future prices for December, following the same general trend, registered 36.06¢ a pound on September 3, rose to 36.97¢ a pound on September 7, and then fell to the low for the month of 35.80¢ on September 10. The high for the month, 37.95¢, was reached on September 30.

With consumption running well above the current production and the fact that foreign demand is cutting into the low carryover, the statistical position of the market is particularly strong. Among other factors adding to this position was the official September production estimate which forecast 9,171,000 bales, a drop of 119,000 bales since the August 1 estimate; the fact that no change in the export subsidy payment rate is contemplated for the near future; and the OPA order, allowing that 5¢ of the 8¢ wage increase of certain cotton mills be included in textile ceilings, and the prospects of another increase in cotton textile maximum prices next month. The resignation of Secretary of Commerce Henry A. Wallace also acted as an underlying supporting influence.

While the decline in securities was considered a major factor in the recession in the cotton market, liquidation caused by outside interests nervousness, owing to reports of high-priced inventories of textile firms, and the domestic labor situation involving the trucking and maritime strikes among others, also contributed to the falling off of prices.

Fabrics

In spite of price increases granted to manufacturers no great amount of forward business was entered into during September, though a fair volume of goods for immediate delivery was released.

On August 30 the OPA issued Amendment 32 to SO 131 increasing ceilings on cotton goods for September to reflect changes in raw staple costs during the July 23—August 22 base period. This order increases cotton textile prices about 2½% at the producers' level and gives a new method of figuring the monthly price changes using a cents-per-pound increase factor for carded-yarn textiles and combed-yarn factors which each producer may use to figure his price per yard of materials.

A further increase in the retail prices of cotton goods, affecting more than half of the total volume of cotton production, was established by Amendment 33 to SO 131 effective September 18. The action was a consequence of the 5¢ an hour wage increase granted cotton textile mills by the National Wage Stabilization Board. This was reflected in an average increase of 2% in the ceilings of cotton textiles made by mills paying approved wages. For most common types of carded fabrics, such as denim, print cloth, and sheeting the advance is under 2%.

Although OPA failed to bring hose and belting duck under incentive pricing, the sharp losses incurred previously in producing this item have been relieved through the tying of ceilings in with raw cotton costs. Even though current output is being sold at around 1¢ under the cotton cost, it is noted that the squeeze is less severe than before.

Primary textile markets remained constricted on forward selling plans as they anticipate another ceiling increase in October to cover currently higher raw cotton costs. Textile men stress that orderly marketing is being hampered by such periodic revisions and urge that an escalator pricing program be adopted that will facilitate day to day selling.[1] Leading producers state that their forward sales policy in October will rest upon their ability to replace raw cotton at a figure comparable to that used as the basis for new ceilings. If this can be done, mills indicate they will book through the year-end; otherwise they will again hold selling to the current month.

Owing to the unseasonably warm weather, and lack of rain, some types of women's raincoats are now in stock; however men's and boys' wear is still in short supply.

[1] In view of this policy we are discontinuing our fabrics price listing to avoid confusion, but will resume its publication when more settled conditions permit.

SCRAP RUBBER

INTEREST in the scrap rubber trade this month centered on the clause in R-1, as amended August 21, which reads, "Scrap tires bearing the markings S-7 or of equal or higher quality may be used or consumed only in the manufacture of reclaimed rubber." A strict interpretation of this ruling, dealers say, would practically put tire splitters out of business and would work understandable havoc among dealers themselves. In view of the fact that the CPA in the same order indicated that tires containing more than 50% natural rubber need not be marked by manufacturers, scrap dealers are wondering how it will be possible properly to segregate and sort these tires that are to go only to reclaimers.

It is understood that the new rulings were initiated to increase production of reclaim and in the belief that there were sufficient lower-grade scrap tires to use for purposes other than reclaim. Dealers are studying the new rulings carefully and waiting for further clarification from CPA.

The whole question of segregation has become so difficult that dealers are in despair. Reclaimers have been stricter in examining shipments of tires and tubes, and the frequency of rejections has shown an alarming spurt. Dealers in Akron have seen fit to raise their buying prices by $1 a ton on tires, while peelings are up 50¢ a ton. Peelings are moving very sluggishly, it is reported, while tubes are at a virtual standstill. Some export business is noted, but is not claimed to be substantial because of rigid restrictions on segregation.

The following are dealers' buying prices for scrap rubber, in carload lots, delivered points indicated:

	Eastern Points	Akron, O.
	(Net Tons)	
Mixed auto tires	$17.50	$19.00
Truck and bus tires	17.50	18.00
Beadless tires	23.00	24.00
S.A.G. passenger (natural)	17.50	18.00
S.A.G. passenger (synthetic)	nom.	nom.
S.A.G. truck (natural)	15.50	16.50
S.A.G. truck (synthetic)	nom.	nom.
No. 1 peelings (natural)	44.00	45.00
No. 1 peelings (synthetic)	nom.	nom.
No. 1 peelings (recap.)	37.00	nom.
No. 2 peelings (natural)	30.00	30.50
No. 2 peelings (synthetic)	nom.	nom.
No. 2 peelings (recap.)	23.00	nom.
No. 3 peelings (natural)	28.00	29.00
No. 3 peelings (synthetic)	nom.	nom.
	(¢ per Lb.)	
Mixed auto tubes	5.5	5.25
Red passenger tubes	7.25	7.25
Black passenger tubes	6.25	6.25
Black truck tubes	6.0	6.125
Mixed puncture-proof tubes	2.0	2.0
Air brake hose	nom.	nom.
Rubber boots and shoes	nom.	nom.

Fixed Government Prices*

	Price per Pound: Civilian Use	Price per Pound: Other Than Civilian Use
Guayule		
Guayule (*carload lots*)	$0.17½	$0.31
Latex		
Normal (*tank car lots*)	.26	.43½
Creamed (*tank car lots*)	.26¾	.44¼
Centrifuged (*tank car lots*)	.27¾	.45¼
Heat-Concentrated (*carload drums*)	.29½	.47
Plantation Grades		
No. 1X Ribbed Smoked Sheets	.22½	.40
1X Thin Pale Latex Crepe	.22½	.40
2 Thick Pale Latex Crepe	.22	.39½
1X Brown Crepe	.21⅜	.38⅞
2X Brown Crepe	.21⅛	.38⅝
2 Remilled Blankets (Amber)	.21¼	.38¾
3 Remilled Blankets (Amber)	.21⅛	.38⅝
Rolled Brown	.18	.35½
Synthetic Rubber		
GR-M (Neoprene GN)	.27½	.45
GR-S (Buna S)	.18½	.36
GR-I (Butyl)	.18½	.33
Wild Rubber		
Upriver Coarse (crude)	.12⅝	.26⅛
(washed and dried)	.20¼	.37¾
Islands Fine (crude)	.14⅝	.28¾
(washed and dried)	.22½	.40
Caucho Ball (crude)	.11⅝	.24¾
(washed and dried)	.19½	.37
Mangabiera (crude)	.08½	.19¾
(washed and dried)	.18	.35½

* For a complete list of all grades of all rubbers see Rubber Reserve Co. Circular 17, p. 169, May, 1943, issue.

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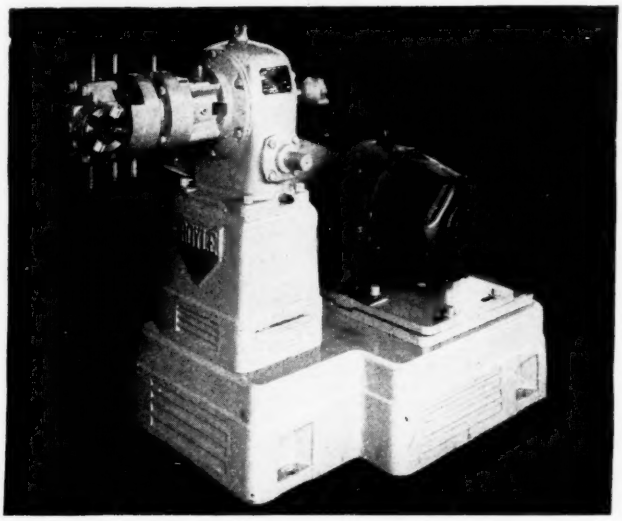

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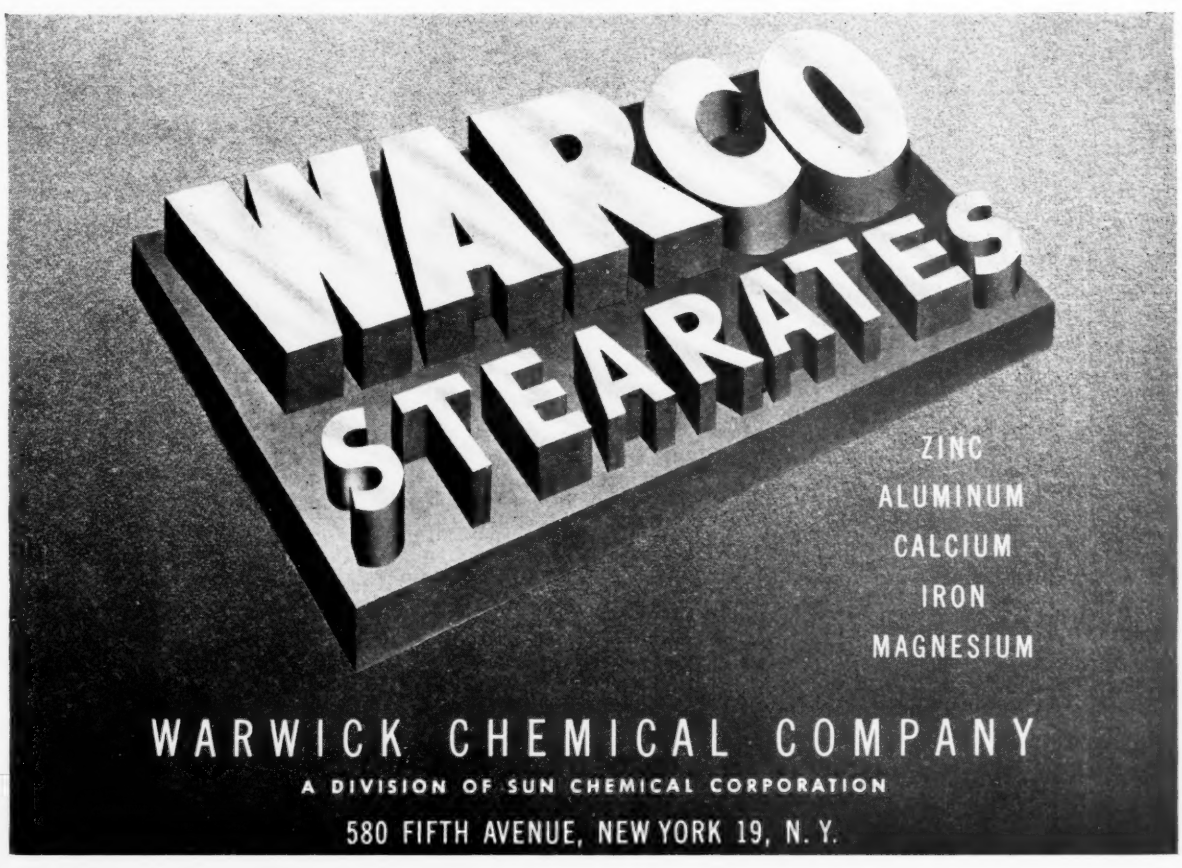


RECLAIMED RUBBER

CONDITIONS in the reclaimed rubber industry remained relatively unchanged last month. Production continued at peak capacity, with demand at high levels. The slight slackening of demand noted in August was still apparent and resulted in shipments of reclaim being sent to new customers not on previous allocation lists. Demand, however, was still great enough to more than cover production.

Although natural rubber scrap was still in great demand by reclaimers, it was reported that one mill was accepting up to 20% synthetic rubber scrap, as contamination in natural scrap shipments, and is actively on the market for high-grade all-synthetic scrap. In refutation of scrap dealers' complaints that synthetic scrap is not moving, reclaimers state that the bulk of the large quantities of such scrap being offered is of very low grade and poorly segregated. Reclaimers report a substantial increase in the production of synthetic reclaim, although shipments are being made primarily to new customers.

Reclaimed Rubber Prices

	Sp. Grav.	¢ per Lb.
Auto Tire		
Black Select	1.16-1.18	7½ / 7¾
Acid	1.18-1.22	8½ / 8¾
Shoe		
Standard	1.56-1.60	8 / 8¼
Tubes		
Black	1.19-1.28	12¼/12½
Gray	1.15-1.26	13 /14
Red	1.15-1.32	13 /13½
Miscellaneous		
Mechanical blends	1.25-1.50	5½ / 6½

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

New Incorporations

Acme-Hamilton Mfg. Corp., Wilmington, Del. Capital, $1,875,000. To manufacture and trade in caoutchouc, India rubber, etc.

L. Albert & Son, Inc., Trenton, N. J. Capital, 2,500 common shares, no par value, 1,600 subscribed. Incorporators: S. L. R., P. E., E., and H. W. Albert and P. A. and T. B. Sutnick. To make rubber and plastic manufacturing machinery.

Desert Rubber Co., Inc., Pasadena, Calif. Capital, $200,000. Directors: H. H. Anderson, Altadena; J. K. Blanche, San Marino; and C. M. Fueller, Pasadena, all in Calif. Representatives: Blanche & Fueller, 26 N. Marengo Ave., Pasadena, Calif.

Dolan Rubber Co., Omaha, Neb. Capital, stock limited to $50,000. Incorporators: R. R. Simon and L. G. Ballantyne, both of Omaha, Neb. To manufacture rubber items.

Eastern Rubber Specialties Co., Hartford, Conn. Capital $2,000; 20 common shares, no par value. Officers: president, E. P. Schavoir; vice president, K. F. Schavoir, both of Glenbrook; treasurer, S. Kahn; secretary, F. Kahn, both of New York.

Electro-Matic Rubber Casting Corp., Barrington, R. I. Capital, $10,000 preferred, and 100 common shares, no par value. Incorporators: C. R. Haslam and E. T. Arnold, both of Providence; W. V. Sumpter, Warren, all in R. I. To manufacture rubber, synthetic rubber, plastics, etc.

Granite State Rubber Co., Boston, Mass. Capital, 1,000 common shares, no par value. Officers: president, K. E. Trazzare; treasurer, J. G. Edelstein, 85 Devonshire St., Boston, Mass.; and clerk, A. Svetkey.

National Hygienic Products Corp., Wilmington, Del. Capital, 10,000 shares, no par value. To manufacture rubber, synthetic rubber, etc.

Plabell Rubber Products, Inc., 318 St. Clair St., Toledo, O. Capital, 500 shares, no par value. Incorporators: A. B. Bellg, A. M. Place, and I. E. Bankey. To manufacture rubber products.

Yaleco Rubber Co., New Haven, Conn. Capital, $36,000. Incorporators: L. and C. D. Ferrucci, both of North Haven, and R. Ferrucci, Hamden, all in Conn.

Financial

(*Continued from page* 103)

Denman Tire & Rubber Co., Warren, O. Six months to June 30: net income, $163,975, or 84¢ each on 195,075 common shares; net sales of $1,973,989.

Union Asbestos & Rubber Co., Chicago, Ill. First six months, 1946: net profit, $192,468, equal to 40¢ each on 475,376 capital shares.

Westinghouse Electric Corp., East Pittsburgh, Pa. Six months to June 30: net loss, $341,605, against net profit of $9,046,172 in the 1945 period.

Intercontintental Rubber Co., Inc., New York, N. Y., and subsidiaries. (Corrected from our September issue.) Six months to June 30: net income, $90,304, against $372,482 in the same months a year ago; gross profit on sales, (not net sales), $221,688, against $671,422; provision for income taxes, $41,897, against $191,949; current assets, June 30, $2,141,915; current liabilities, $305,060, against $2,123,063 and $198,110, respectively, on December 31, 1945.

Trade Marks

(*Continued from page* 108)

421,854. **Aristocrat.** Tennis balls. W. J. Voit Rubber Corp., Los Angeles, Calif.

421,916. **"Rez-N-Dye."** Plastic dyes and thinner therefor. Schwartz Chemical Co., New York, N. Y.

421,924. **Jantzen.** Footwear and foundation garments. Jantzen Knitting Mills, Portland, Oreg.

421,925. Representation of a girl diving and the word: **"Jantzen."** Footwear and foundation garments. Jantzen Knitting Mills, Portland, Oreg.

421,960. Representation of a pennant flying over a stadium with a representation of a duck and the words: **"Dandux Sporting Goods,"** on the pennant. C. R. Daniels, Inc., Baltimore, Md.

422,014. **Teencraft.** Rainwear. Collegian Accessories, New York, N. Y.

422,032. **Paraglas.** Shower curtains and window drapes. Para Mfg. Co., Inc., Newark, N. J.

422,057. **Flexomatic.** Footwear. Endicott Johnson Corp., Endicott, N. Y.

422,059. The letters: **"RC,"** with the **"R"** on a square of contrasting color, and **"C"** on a circle of the contrasting color. Baby pants. Rubber Corp. of America, Brooklyn, N. Y.

422,069. **Sunruco.** Volley balls and basket balls. Sun Rubber Co., Barberton, O.

422,091. **Play-A-Bouts.** Footwear. British West Indies Co., New York, N. Y.

422,112. **"Dead-Locker."** Windshield wiper arms and blades. Anderson Co., Gary, Ind.

422,136. **The Foundation of Natural Beauty.** Foundation garments, girdles, and brassieres. Jantzen Knitting Mills, Portland, Oreg.

422,186. Representation of a winged foot separating the word: **"Goodyear."** Ink rolls for printing presses, rubber mallets, hammer cushions, and bandsaw bands. Goodyear Tire & Rubber Co., Akron, O.

422,230. **Sunfed.** Reinforced laminated transparent film. Dobeckmun Co., Cleveland, O.

422,261. **Handi Golf.** Golf game. Burgess Battery Co., Freeport, Ill.

422,356. **Goodrite.** Rubber chemicals. B. F. Goodrich Co., doing business as B. F. Goodrich Chemical Co., a division of the B. F. Goodrich Co., New York, N. Y.

422,389. **Statler Manufacturing Company.** Synthetic plastics. Statler Mfg. Co., assignor to Statler Mfg. Co., both of Chicago, Ill.

422,429. Representation of a man made out of a roll of adhesive tape. Adhesive tapes. International Plastic Corp., Morristown, N. J.

422,457. **Syntilite.** Transparent and translucent flexible films formed of synthetic resins. Plastic Film Corp., New York, N. Y.

422,528. **Rubrbond.** Latex adhesive. Industrial Latex Co., New York, N. Y.

422,598. Representation of King Neptune riding through the ocean in a chariot pulled by sea horses, and the word: **"Neptune."** Adhesive belt cement. Graton & Knight Co., Worcester, Mass.

422,599. **Brigadier.** Pneumatic tires. General Tire & Rubber Co., Akron, O.

422,642. The letters: **"F"** and **"B"** enclosed within a double circle, one of which is projected through the circle separating the letters. Rubber manufacturing machinery. Farrel-Birmingham Co., Inc., Ansonia, Conn.

422,644. **Randflex.** Leather substitute. Rand Rubber Co., Brooklyn, N. Y.

422,660. **Gold Wings.** Golf Balls. McDonald & Son Golf Ball Co., West Chicago, Ill.

422,661. **Silver Wings.** Golf Balls. McDonald & Son Golf Ball Co., West Chicago Ill.

422,691. Representation of a fanciful duckling. Waterproof shipping bags. Bemis Bro. Bag Co., St. Louis, Mo.

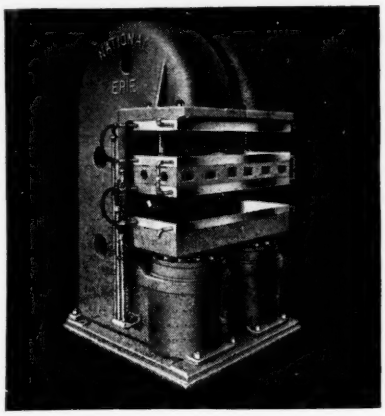
422,723. The word: **"Raybestos,"** with a representation of a wing forming part of the letter, **"R."** Brake linings and clutch facings. Raybestos-Manhattan, Inc., Passaic, N. J.

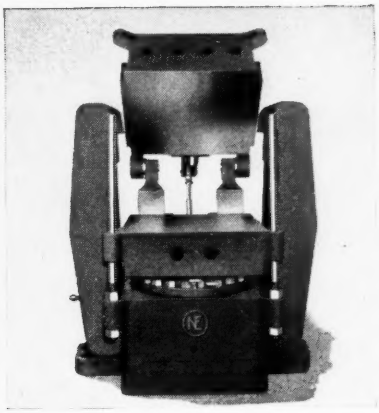
Trade Lists Available

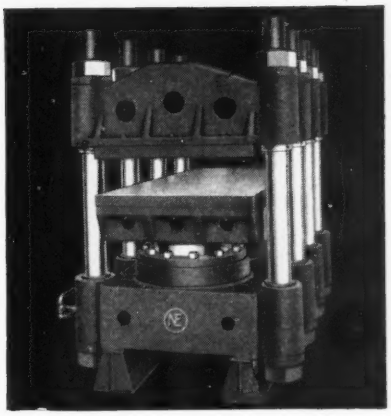
The Commercial Intelligence Division of the United States Department of Commerce, Washington 25, D. C., recently compiled the following trade lists, of which mimeographed copies may be obtained by American firms from this Division. The price is $1 a list for each country.

Tire Retreading, Recapping, and Repairing Plants—Mexico.

Manufacturers of Rubber Goods—Argentina; Belgium; Burma; Czechoslovakia; Dominican Republic; Ecuador; Finland; Greece; El Salvador; Ireland; Netherlands; New Zealand; Nicaragua; Philippine Islands; Portugal; Union of South Africa; Uruguay.







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Synthetic Rubber Latex Compounds
Synthetic Resin Compounds and Adhesives
Synthetic Latex Adhesives
Aqueous Dispersions of Reclaimed Rubber

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COMPOUNDING INGREDIENTS

Current Quotations*

Abrasives

Pumicestone, powdered	lb.	$0.035 / $0.05
Rottenstone, domestic	lb.	.0138/ .015

Accelerators, Inorganic

Lime, hydrated	ton	8.00 / 12.00
Litharge, commercial	lb.	.0975/ .115
Eagle, sublimed	lb.	.1025/ .1075
FBS	lb.	.0975/ .115
Red Lead, commercial	lb.	.1075/ .13
Z2 RM	lb.	.1125/ 13
White lead, basic	lb.	.0975/ .1025
Eagle	lb.	.0975/ .10
Silicate	lb.	.073 / .135
Eagle	lb.	.12 / .1325
Zinc oxide, commercial†	lb.	.07 / .0975

Accelerators, Organic

A-10	lb.	.36 / .42
A-19	lb.	.52 / .58
A-32	lb.	.59 / .69
A-77	lb.	.42 / .55
A-100	lb.	.42 / .55
Accelerator 8	lb.	.63 / .65
49	lb.	.40 / .42
552	lb.	1.63
808	lb.	.59 / .61
833	lb.	1.13 / 1.15
Acrin	lb.	.65
Advan	lb.	.55
Altax	lb.	.39 / .41
Antox	lb.	.54 / .56
Arazate	lb.	1.53
Beutene	lb.	.59 / .64
B-J-F	lb.	.34 / .39
Butasan	lb.	1.10
Butazate	lb.	1.10
Butyl Eight	lb.	.97 / .99
Zimate	lb.	1.10
Captax	lb.	.34 .4275
C-P-B	lb.	1.95
Cumate	lb.	1.60
Cuprax	lb.	.60 / .62
Diesterex N	lb.	.56 / .57
DOTG (diorthotoylguanidine)	lb.	.44 / .46
DPG (diphenylguanidine)	lb.	.35 / .41
El-Sixty	lb.	.36 / .43
Ethasan	lb.	1.10
Ethazate	lb.	1.10
Ethyl Selenac	lb.	1.60
Tuads	lb.	1.25
Tuex	lb.	1.25
Zimate	lb.	1.10
Ethylidene Aniline	lb.	.42 / .43
Formaniline	lb.	.36 / .37
Good-Rite Erie	lb.	.60 / .62
Hepteen	lb.	.34 / .39
Base	lb.	1.25 / 1.40
M-B-T	lb.	.34 / .39
M-B-T-S	lb.	.39 / .44
Methasan	lb.	1.20
Methazate	lb.	1.20
Methyl Selenac	lb.	1.60
Tuads	lb.	1.25
Zimate	lb.	1.20
Monex	lb.	1.25
Mono-Thiurad	lb.	1.25
Morfex 33	lb.	.60 / .65
O-X-A-F	lb.	.38 / .43
Pentex	lb.	.74 / .84
Flour	lb.	.1225/ .1325
Permalux	lb.	1.18 / 1.20
Phenex	lb.	.49 / .54
Pipazate	lb.	1.53
Polyac	lb.	1.25
Rotax	lb.	.44 / .46
Safex	lb.	1.15 / 1.25
Santocure	lb.	.60 / .67
Selazate	lb.	1.60
SPDX-G	lb.	.53 / .58
Tellurac	lb.	1.60
Tetrone	lb.	1.25
A	lb.	1.85
Thiocarbanilide	lb.	.28 / .33
Thiofide	lb.	.39 / .46
Thionex	lb.	1.25
Thiotax	lb.	.34 / .41
Thiurad	lb.	1.25
Thiuram E	lb.	1.25
M	lb.	1.25
Trimene	lb.	.54 / .64
Base	lb.	1.03 / 1.18
Triphenylquanidine (TPG)	lb.	.45
Tuex	lb.	1.25
2-MT	lb.	.58 / .60
Ulto	lb.	.99 / 1.04
J	lb.	1.04
Ureka	lb.	.50 / .57
Blend B	lb.	.50 / .57
C	lb.	.48 / .55
Vulcanex	lb.	.42 / .43
Z-B-X	lb.	2.45
Zenite	lb.	.37 / .39
A	lb.	.42 / .44
B	lb.	.39 / .41

Activators

Activex	lb.	$0.20 / $0.22
Aero AC 50	lb.	.46 / .52
Barak	lb.	.50
Bunac K-17	lb.	.17 / .19
D-B-A	lb.	1.95
Delac P	lb.	.39 / .48
Double distilled cottonseed fatty acids	lb.	.1175/ .14
Guantal	lb.	.39 / .48
Laurex	lb.	.1475/ .1725
Lead oleate	lb.	.1775
MODX	lb.	.295 / .345
Neo-Fat H.F.O.	lb.	.1478/ .1678
1-60	lb.	.1438/ .1578
1-65	lb.	.165 / .18
13	lb.	.225 / .23
Palmalene	lb.	.15
Plastone	lb.	.27 / .30
Ridacto	lb.	.20
Stearex Beads	lb.	.1478/ .1578
Double pressed	lb.	.1578/ .1678
Single pressed	lb.	.1538/ .1638
Stearic acid, s.p.	lb.	.1538/ .1558
Stearite	lb.	.1478
Tonox	lb.	.50 / .59
Zinc stearate	lb.	.29 / .45

Alkalies

Caustic soda, flake	100 lbs.	2.70 / 5.70
Liquid, approx. 50%	100 lbs.	1.925 / 2.00
Solid	100 lbs.	2.30 / 3.95

Antioxidants

AgeRite Alba	lb.	1.95 / 2.05
GE1	lb.	1.95 / 2.05
Hipar	lb.	.52 / .54
H.P.	lb.	.61 / .63
Powder	lb.	.53 / .55
Resin	lb.	.40 / .42
D	lb.	.43 / .45
Stalite	lb.	.40 / .42
White	lb.	.40 / .42
Akroflex C	lb.	1.23 / 1.33
Albasan	lb.	.53 / .55
Aminox	lb.	.69 / .74
Antox	lb.	.40 / .49
Aranox	lb.	.54 / .56
Betanox	lb.	1.95
B-L-E	lb.	.43 / .52
Powder	lb.	.40 / .49
B-X-A	lb.	.61 / .70
Copper Inhibitor X-872-A	lb.	.43 / .52
Flectol H	lb.	1.15
Flexamine	lb.	.40 / .47
Heliozone	lb.	.53 / .62
Neozone (standard)	lb.	.23 / .24
A	lb.	.61 / .63
C	lb.	.40 / .42
D	lb.	.43 / .45
Distilled	lb.	.40 / .42
Parazone	lb.	.45 / .47
Parflectol	lb.	.68
Permalux	lb.	.53 / .60
Rio Resin	lb.	1.18 / 1.20
Santoflex B	lb.	.36 / .38
BX	lb.	.40 / .47
Santovar O	lb.	.54 / .61
Santowhite	lb.	1.15 / 1.40
S.C.R.	lb.	1.23 / 1.38
Solux	lb.	.32 / .34
Stabilite	lb.	1.28 / 1.30
Alba	lb.	.48 / .50
Sunproof	lb.	.69 / .74
Jr.	lb.	.2275/ .2775
Thermoflex	lb.	.1625/ .2125
A	lb.	1.18 / 1.20
C	lb.	.61 / .63
Tonox	lb.	.54 / .56
Tysonite	lb.	.50 / .59
V-G-B	lb.	.165 / .1725
Zenite	lb.	.43 / .52

Antiseptics

Copper naphthenate, 6-8%	lb.	.15 / .17
G-4	lb.	.95 / 1.40
G-11	lb.	4.50 / 4.75
Pentachlorophenol	lb.	.20 / .25
Resorcinol, technical	lb.	.64 / .74
Zinc naphthenate, 6-10%	lb.	.16 / .195

Blowing Agents

Ammonium bicarbonate	lb.	.0564
Carbonate	lb.	.0825/ .175
Sodium bicarbonate	100 lbs.	1.55 / 2.45
Carbonate, technical	100 lbs.	.90 / 3.25
Unicel	lb.	.50

*Prices in general are f.o.b. works. Range indicates grade or quantity variations. Space limitation prevents listing of all known ingredients. Prices are not guaranteed and those readers interested should contact suppliers for spot prices.

†For trade names, see Color—White, Zinc Oxide.

Brake Lining Saturants

B.R.T. No. 3	lb.	$0.0175/ $0.0185
Resinex L-5	lb.	.015 / .0225

Carbon Blacks

Conductive Channel—CC

Continental R-20	lb.	.055 / .102
R-40	lb.	.055 / .102
Spheron C	lb.	.08 / .125
I	lb.	.066 / .111
N	lb.	.185 / .25
Voltex	lb.	.11 / .13

Easy Processing Channel—EPC

Continental AA	lb.	.055 / .102
Kosmobile 77/Dixiedensed 77	lb.	.055 / .0825
Micronex W-6	lb.	.055 / .097
Spherone #9	lb.	.055 / .102
Witco #12	lb.	.055 / .102
Wyex	lb.	.055 / .117

Hard Processing Channel—HPC

Continental F	lb.	.055 / .102
HX	lb.	.055 / .117
Kosmobile S/Dixiedensed S	lb.	.055 / .0825
Micronex Mark II	lb.	.055 / .097
Spheron #4	lb.	.055 / .102
Witco #6	lb.	.055 / .102

Medium Processing Channel—MPC

Arrow TX	lb.	.055 / .117
Continental A	lb.	.055 / .102
Kosmobile S-66/Dixiedensed S-66	lb.	.055 / .0825
Micronex Standard	lb.	.055 / .097
Spheron #6	lb.	.055 / .102
Witco #1	lb.	.055 / .102

Conductive Furnace—CF

Statex A	lb.	.08 / .10
Sterling I	lb.	.09

Fine Furnace—FF

Statex B	lb.	.0525/ .09

High Elongation Furnace—HEF

Sterling K	lb.	.05 / .075

High Modulus Furnace—HMF

Continex HMF	lb.	.16
Kosmos 40/Dixie 40	lb.	.05 / .075
Modulex	lb.	.05 / .075
Philblack A	lb.	.05 / .06
Statex 93	lb.	.05 / .075
Sterling L	lb.	.05 / .075

Semi-Reinforcing Furnace—SRF

Continex SRF	lb.	.035 / .055
Essex	lb.	.035 / .055
Furnex	lb.	.035 / .06
Gastex	lb.	.035 / .06
Kosmos 20/Dixie 20	lb.	.035
Pelletex	lb.	.035 / .06
Sterling R, S	lb.	.036 / .06

Fine Thermal—FT

P-33	lb.	.045

Medium Thermal—MT

Thermax	lb.	.0225

Colors

Black

Lampblack, commercial	lb.	.085 / .385

Blue

Du Pont	lb.	.90 / 3.95
Toners	lb.	.30 / 3.50

Brown

Mapico	lb.	.1135

Green

Chrome	lb.	.24 / .335
Oxide	lb.	.24
Du Pont	lb.	1.10 / 2.85
Guignet's	lb.	.70
Toners	lb.	.35 / 4.00

Orange

Du Pont	lb.	2.35 / 3.05
Toners	lb.	.30 / 1.50

Red

Antimony crimson, 15-17%	lb.	.48
Antimony, R.M.P. No. 3	lb.	.48
Sulfur free	lb.	.52
Du Pont	lb.	.48 / 1.65
Iron oxide	lb.	.07 / .15
Mapico	lb.	.0885/ .096
Rub-Er-Red	lb.	.0975
Toners	lb.	.25 / 4.15

White

Lithopone, titanated	lb.	.0575/ .0625

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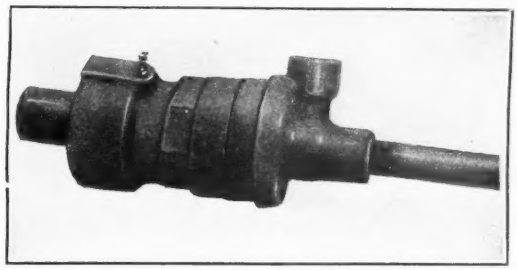

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Red Lead (95% • 97% • 98%) **Sublimed Blue Lead**
Sublimed Litharge **Sublimed White Lead**
Litharge **Basic White Lead Silicate**
Basic Carbonate of White Lead

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White (*Cont'd*)

Titanium pigments		
Rayox LW	lb.	$0.145 / $0.1525
R-110	lb.	.155 / .1625
Titanox-A series	lb.	.145 / .1525
Titanox-AA	lb.	.145 / .1525
B-30	lb.	0575/ .06
C	lb.	.055 / .0575
RA, RA-10	lb.	.155 / .1625
RCHT	lb.	.055 / .0575
Zopaque	lb.	.145
Zinc oxide, commercial	lb.	.07 / .0975
Azo ZZZ-11, -44, -55	lb.	.0725/ .075
-66	lb.	.0905/ .0975
Eagle AA, lead free	lb.	.0725/ .075
37% leaded	lb.	.07 / .0725
Florence Green Seal-8	lb.	.09 / .0975
Red Seal-9	lb.	.085 / .0875
White Seal-7	lb.	.095 / .0975
Horsehead XX-4, 78, 166	lb.	.0725/ .075
XX Special 3	lb.	.0725/ .075
Kadox-15, -17, -72	lb.	.0725/ .075
-25	lb.	.085 / .0875
St. Joe, lead free	lb.	.0725/ .075
Zinc sulfide commercial	lb.	.084 / .089
Cryptone ZS-800	lb.	.084 / .0865

Yellow

Chrome	lb.	.1725/ .1885
Du Pont	lb.	1.37 / 1.75
Mapico	lb.	.0685/ .071
Toners	lb.	.50 / 1.37

Dispersing Agents

Darvan No. 1	lb.	.155 / .30
2	lb.	.19 / .30
Stan-Chem	lb.	.1225/ .2587
Triton R-100	lb.	.12 / .25

Dusting Agents

Glycerized Liquid Lubricant, concentrated	gal.	1.50
Lubrex	lb.	.25 / .30
Mica	lb.	.045 / .07
Pyrax A, W.A.	ton	10.50 / 12.00
Zinc stearate	lb.	.29 / .45

Extenders

Advagum 1098	lb.	.42
1198	lb.	.40
B. R. T. No. 7	lb.	.02 / .021
Extender 15	lb.	.32
Factice		
Amberex Type B	lb.	.20
Brown	lb.	.095 / .19
Neophax A	lb.	.165
White	lb.	.10 / .20
Insulac W	lb.	.055 / .06
Mineral Rubbers		
Black Diamond	ton	25.00 / 30.00
Extender 600	lb.	.1643
Hard hydrocarbon	ton	28.50 / 30.50
No. 38	ton	25.00
Parmr	ton	21.00 / 29.00
Multi-Plast	lb.	.0425/ .0475
Naftolen HV	lb.	.11 / .12
LV, MV	lb.	.0525/ .0575
R-100	lb.	.11 / .12
Nuba Nos. 1, 2	lb.	.029
No. 3X	lb.	.0425
Rubber Substitutes,		
Black	lb.	.09 / .15
Brown	lb.	.105 / .1875
White	lb.	.0975/ .165
Synthetic 100	lb.	.41
Vinosol Resin	lb.	.025 / .035
Vistanex	lb.	.32 / .36

Fillers, Inert

Asbestos fiber	ton	15.50 / 49.50
Barytes, floated white	ton	25.35 / 36.00
Off-color, domestic	ton	17.50 / 18.00
Blanc fixe, dry, precip.	ton	60.00 / 80.00
Clays		
Champion	ton	12.00
Crown	ton	11.00 / 23.00
Kalite	ton	26.00
McNamee	ton	11.00
Flocks		
Cotton, dark	lb.	.095 / .112
Dyed	lb.	.45 / .85
White	lb.	.12 / .20
Fabrifil X-24-G	lb.	.095
X-24-W	lb.	.135
Filtrol 4000	lb.	.16
F-40-9000	lb.	.105
Lead sulfate, basic	lb.	.085 / .09
Lithopone, commercial	lb.	.044 / .049
Albalith	lb.	.044 / .0465
Eagle	lb.	.0725/ .075
Mica	lb.	.045 / .07
Pyrax A, W.A.	ton	10.50 / 12.00
Titanox-C, RCHT	lb.	.055 / .0575
White lead, sublimed	lb.	.0875/ .0925
Eagle	lb.	.085 / .0875
Whiting, limestone	ton	6.00 / 9.00
Suprex White	ton	12.00
Witco	ton	6.50

Finishes

Flocks		
Cotton, dark	lb.	.095 / .112
Dyed	lb.	$0.45 / $0.85
White	lb.	.12 / .20
Rayon, colored	lb.	.90 / 1.50
White	lb.	.75 / 1.25
Rubber lacquer, clear	gal.	1.00 / 2.00
Colored	gal.	2.00 / 3.50
Shoe varnish	gal.	1.45
Talc	ton	11.00 / 30.00
Waxes		
Carnauba, No. 1 yellow	lb.	2.00 / 2.03
No. 2, non-chalky	lb.	1.78 / 1.80
Yellow	lb.	1.98 / 2.05
No. 3, chalky	lb.	1.72 / 1.74
Non-chalky	lb.	1.75 / 1.78
Montan	lb.	.53 / .55
No. 118, colors	gal.	.86 / 1.41
Neutral	gal.	.76 / 1.31
Van Wax	gal.	1.25 / 1.30

Latex Compounding Ingredients

Accelerator 89	lb.	1.20
122	lb.	1.30
Advawet 10	lb.	.46
Aerosol	lb.	.35
Antox, dispersed	lb.	.54
Aquarex BBX concentrated	lb.	.70
D	lb.	.60
MDL Paste	lb.	.25
Black No. 25, dispersed	lb.	.22
Casein	lb.	.24 / .2475
Dispersed sulfur No. 2	lb.	.08 / .12
Factex Dispersion A	lb.	.185
Laton L	lb.	.075 / .0775
Marmix	gal.	1.35 / 1.75
Micronex, colloidal	lb.	.06 / .07
pHR latex chemical	lb.	1.25
Pip-Pip	lb.	1.63
R-2 Crystals	lb.	1.55
Resin V	lb.	.13
S-1	lb.	.80
Setsit No. 5	lb.	.75 / 1.00
Stablex A	lb.	.90 / 1.10
B	lb.	.70 / .90
G	lb.	.40 / .50
Tepidone	lb.	.63
Tergito wetting agents	lb.	.265 / .37
Zinc oxide, dispersed	lb.	.12 / .15

Mold Lubricants

Aluminum stearate, precip.	lb.	.275 / .285
Aquarex D	lb.	.60
MDL Paste	lb.	.25
Carbowax compounds	lbs.	.24 / .35
Colite Concentrate	gal.	.90 / 1.15
DC Mold Release Fluid	lb.	5.70 / 6.15
Emulsion No. 35	lb.	2.60 / 3.50
Glycerized Liquid Lubricant, concentrated	gal.	1.50
Lubrex	lb.	.25 / .30
Montan Wax	lb.	.53 / .55
Para Lube	lb.	.046 / .048
Rubber-Glo	gal.	.97 / 1.15
Sericite	ton	65.00
Soapstone	ton	15.00 / 35.00
Sodium stearate	lb.	.19 / .24

Odorants

Coumarin	lb.	2.75 / 3.10
Curodex 19	lb.	4.75
188	lb.	5.75
198	lb.	6.75
Para-Dors, A, B, C, D, E	lb.	.25 / 4.00
Rodo No. 0	lb.	4.00 / 4.50
No. 10	lb.	5.00 / 5.50
Vanillin	lb.	2.35 / 4.65

Plasticizers and Softeners

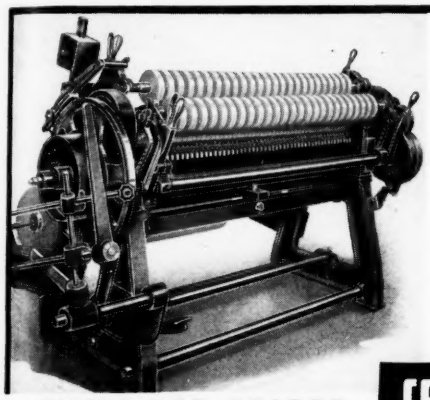
Akroflex C	lb.	.53 / .55
Arneel HT	lb.	.30 / .35
T	lb.	.27 / .32
TO	lb.	.17 / .22
TOD	lb.	.23 / .28
Bardex	lb.	.0425/ .045
Bardol	lb.	.02 / .0275
B	lb.	.05 / .0525
Barium stearate	lb.	.29 / .355
Bondogen	lb.	.55 / .60
B.R.T. No. 7	lb.	.02 / .021
Bunarex resins	lb.	.053 / .0625
Bunnatol G, S	lb.	.40 / .50
Butac	lb.	.1061/ .1436
Butyl Roleate	lb.	.16 / .195
Calcium stearate	lb.	.26 / .305
Contogums	lb.	.0675/ .1025
Dibenzyl phthalate	lb.	.51 / .59
Sebacate	lb.	.67 / .74
Dibutyl sebacate	lb.	.557 / .562
Dicapryl phthalate	lb.	.25 / .30
Dipentene 122	gal.	.60 / .75
Dipolymer oil	gal.	.33 / .38
Dispersing oil No. 10	lb.	.0375/ .04
Double distilled cottonseed fatty acids	lb.	.1175/ .14
Duraplex C-50 LV, 100%	lb.	.25 / .295
Dutrex 6	lb.	.025 / .0375
Hercolyn	lb.	.1122/ .1347
IMH	lb.	.65 / .68
Lead oleate	lb.	.1775
Magnesium stearate	lb.	.31 / .355
Migralube	lb.	.30
Multi-Plast	lb.	.0425/ .0475
Naftolen HV	lb.	$0.11 / $0.12
LV, MV	lb.	.0525/ .0575
R-100	lb.	.11 / .12
Neo-Fat H.F.O.	lb.	.14 3/8 / .16 7/8
1-60	lb.	.14 3/8 / .15 7/8
1-65	lb.	.165 / .18
13	lb.	.225 / .23
Neoprene Peptizer P-12	lb.	.75 / .83
Nevillac 10°	lb.	.24
Neville 465 Resin	lb.	.035
R Resins	lb.	.085 / .1375
Nevinol	lb.	.13
Nevoll	lb.	.02 / .025
Nevtex 10	lb.	.0775/ .08
90	lb.	.20
No. 1-D heavy oil	lb.	.04
Palmalene	lb.	.15
Para Resins 2457, 2718	lb.	.04
Paradene Nos. 1, 2	lb.	.0525
Nos. 33, 34	lb.	.0625
No. 35	lb.	.0575
Para Flux, regular	gal.	.17 / .19
No. 2016	gal.	.19 / .20
Para Lube	lb.	.046 / .048
Paraplex A1-111	lb.	.21 / .25
G-25, 100%	lb.	.75
Paroils	lb.	.0975/ .18
Picco 100	lb.	.09
Piccocizer 30	lb.	.055 / .06
Piccolastic Resins	lb.	.20 / .205
Piccolyte Resins	lb.	.15 / .185
Piccoumaron Resin 427	lb.	.0625/ .1075
Resins	lb.	.0625/ .1075
Piccovar	lb.	.10 / .125
Piccovol	lb.	.02 / .0275
Pictar	gal.	.18 / .23
Plasticizer B	lb.	.35 / .45
35	lb.	.205 / .24
36	lb.	.305 / .34
SC	lb.	.50
Plastoflex No. 10	lb.	.20
No. 20	lb.	.25
Plastogen	lb.	.0775/ .08
Plastone	lb.	.27 / .30
R-19, R-21 Resins	lb.	.1075
Reogen	lb.	.115 / .12
Resin C pitch	lb.	.01 / .016
R6-3	lb.	.38 / .40
Resinex	lb.	.025 / .03
Ridbo 369	lb.	.08 / .09
369-F	lb.	.12
RPA No. 2	lb.	.65
No. 3	lb.	.46
No. 5	lb.	.57
RSN Flux	gal.	.10 / .19
Rubberol Compound	lb.	.185
Santicizer B-16	lb.	.32 / .36
E-15	lb.	.34 / .38
M-17	lb.	.355 / .39
Sebacic acid	lb.	.48 / .55
Solvenol	gal.	.56 / .58
Staybelite Resin	lb.	.06 / .065
Stearex Beads	lb.	.14 7/8 / .15 7/8
Double pressed	lb.	.15 7/8 / .16 7/8
Single pressed	lb.	.15 3/8 / .16 3/8
Stearic acid, s. p.	lb.	.15 3/8 / .15 7/8
Stearite	lb.	.14 7/8
Synprolac	lb.	.185 / .195
Synprowax	lb.	.16
Syn Tac	lb.	.33 / .35
Synthol	lb.	.225
TR-11	lb.	.035
Tricresyl phosphate	lb.	.24 / .39
Turgum S	lb.	.0886/ .1086
Tysonite	lb.	.165 / .1725
Vistac No. 1	lb.	1.21 / 1.41
No. 2	lb.	1.61 / 1.75
X-1 resinous oil	lb.	.011 / .016
XX-100 Resin	lb.	.0525
Zinc laurate	lb.	.29 / .38

Reclaiming Oils

B.R.V.	lb.	.03 / .0375
BWH-1	lb.	.10
Dipentene 122	gal.	.60 / .75
Dipolymer oil	gal.	.33 / .38
LX-83	gal.	.15 / .23
-572	gal.	.20 / .28
No. 1 heavy oil	lb.	.04
No. 1621	lb.	.016 / .0235
Picco C-6, -28, -33	gal.	.33 / .38
D-4	gal.	.17 / .22
E-5	gal.	.15 / .20
No. 523 H.S. oil	gal.	.22 / .27
Solvenol	gal.	.56 / .58
S.R.O.	lb.	.015 / .0225
Wilcor Nos. 111, 151	gal.	.26 / .30
X-60 Solvent	gal.	.20 / .28
X-443	gal.	.20 / .27

Reinforcers, Other Than Carbon Black

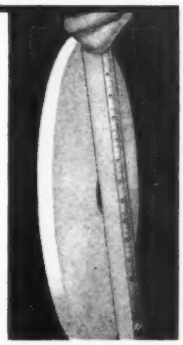
B. R. C. No. 20	lb.	.0105/ .0115
Bunarex 50, 75, 100, 115	lb.	.053 / .0625
Calcene T	ton	37.50 / 45.00
Carbonex, flakes	lb.	.03 / .035
S	lb.	.031 / .036
Plastic	lb.	.031 / .0335
Clays		
Aerfloted Hi-White	ton	10.00
Paragon	ton	10.00
Suprex	ton	11.00 / 23.50
Aluminum flake	ton	15.50 / 25.50
Barden	ton	12.00
Buca	ton	40.00
Catalpo	ton	30.00



CAMACHINE 26-3A • **Positive Separation of Finished Rolls of Tacky Surfaced Materials**

CAMACHINE 26-3A is ideally suited to slitting narrow strip across the full width of the web. Manufacturers and converters of such varied materials as insulating tapes, impregnated fabrics, condenser tissue, artificial leather, starched cloth, pipe wrapping, gutta-percha tape, varnished paper and cloth, cable wrap and masking tape, will find this equipment very efficient and productive in operation.

CAMACHINE 26-3A is designed for economical production of large quantities of narrow strip in rolls.



WRITE FOR FOLDER

CAMERON MACHINE COMPANY · 61 POPLAR STREET BROOKLYN 2, N. Y.

Stamford Neophax Vulcanized Oil

(Reg. U. S. Pat. Off.)

For Use with Neoprene

THE STAMFORD RUBBER SUPPLY CO. STAMFORD CONN.

Makers of Stamford "Factice" Vulcanized Oil

(Reg. U. S. Pat. Off.)

SINCE 1900

QUALITY **INTEGRITY** **SERVICE**

65 YEARS WITHOUT REORGANIZATION

BELTING

Transmission—Conveyor—Elevator

HOSE

for every purpose
Water—Fire—Air—Steam

HOME RUBBER CO. TRENTON, N. J. STEAM NEVER BURN BLOW OUT PACKING CHICAGO NEW YORK

PACKING

Sheet & Rod Packings
for every condition

Mechanical Specialties of Every Description

HOME RUBBER COMPANY

Factory & Main Office
TRENTON 5, N. J.

LONDON: 107 Clifton St., Finsbury **CHICAGO: 168 North Clinton St.** **NEW YORK: 80-82 Reade St.**

Top-Quality that never varies!

THE GENERAL TIRE & RUBBER COMPANY
AKRON, OHIO

WABASH, IND. • HUNTINGTON, W. VA. • WACO, TEXAS
BAYTOWN, TEXAS • BARNESVILLE, GA. • PASADENA, CAL.

Associated Factories:

CANADA • MEXICO • VENEZUELA • CHILE • PORTUGAL

Clays (Cont'd)		
China ton	$7.60	/$15.50
Dixie ton	12.00	
Hydratex R ton	22.00	
Hydrowhite ton	15.00	
Kalvan ton	100.00	
L.G.B. ton	16.00	
Paragon (R) ton	11.00	
Pigment No. 33 ton	30.00	
Witco Nos. 1, 2 ton	25.00	
Cumar EX lb.	.0525	
MH lb.	.065 /	.1175
V lb.	.0975/	.1275
G Resin lb.	.08	
Magnesia, Calcined		
Light, technical lb.	.25 /	.26
Heavy, technical lb.	.05 /	.1275
Extra light, U.S.P. lb.	.26	
Medium light, technical lb.	.12	
Magnesium carbonate lb.	.0725/	.1075
Marbon S, S-1 lb.	.52 /	.65
Neville R Resins lb.	.085 /	.1375
Para Resins 2457, 2718 lb.	.04	
Picco 100 lb.	.09	
Piccolyte Resins lb.	.15 /	.185
Piccoumaron Resins lb.	.0625/	.1075
Piccovar lb.	.10 /	.125
Resin C Pitch lb.	.01 /	.016
Resinex lb.	.025 /	.03
Silene EF lb.	.055 /	.06
Witcarb R ton	100.00	
R-12 ton	32.50	
Zinc oxide, commercial lb.	.07 /	.0975

Retarders

Armeen HTD lb.	.43 /	.53
Cumar RH lb.	.105	
Delac J lb.	.50 /	.60
E-S-E-N lb.	.34 /	.39
M-B-T lb.	.34 /	.39
M-B-T-S lb.	.39 /	.44
R-17 Resin lb.	.1075	
Retarder W lb.	.36	
Retardex lb.	.445 /	.475
RM lb.	1.25	
Thionex lb.	1.25	
Thiuram E, M lb.	1.25	
Vultrol lb.	.50 /	.55

Solvents

Benzol, industrial gal.	.15 /	.20
Bondogen lb.	.55 /	.60
Carbon bisulfide lb.	.05 /	.085
Tetrachloride gal.	.29 /	1.20
Cosol No. 1 gal.	.26 /	.34
No. 2 gal.	.25 /	.33
GVL lb.	1.00	
Nevsol gal.	.185 /	.25
Picco Solvents gal.	.115 /	.27
Skellysolve-B gal.	.071 /	.105
C gal.	.10	
R gal.	.081	
Tollac gal.	.195 /	.25
Toluol, industrial gal.	.22 /	.27
2-50-W Hi-Flash Solvent gal.	.25 /	.30
X-60 Solvent gal.	.20 /	.28
Xylol, industrial gal.	.22 /	.27

Synthetic Rubbers

Butaprene NF lb.	.45 /	.60
NL lb.	.46 /	.53
NXM lb.	.50 /	.65
Chemigum N-1 lb.	.53 /	.60
Hycar latex (dry weight)		
OR-15 lb.	.415 /	.465
OR-25, OS-10 lb.	.345 /	.395
Hycar OR-15 lb.	.43 /	.455
OR-25, OS-10 lb.	.36 /	.385
Neoprene latex (dry weight)		
Type 60 lb.	.32 /	.40
571 lb.	.25 /	.33
572 lb.	.28 /	.36
601 lb.	.30 /	.38
842 lb.	.27 /	.35
Type CG lb.	.50	
E, M lb.	.65	
FR, KNR lb.	.75	
Paraplex X-100 lb.	1.00	
Perbunan 18 lb.	.35 /	.385
26 lb.	.36 /	.395
35 lb.	.38 /	.465
Latex Type H (55%) lb.	.38 /	.42
Silastic		
Coating and laminating grades		
Nos. 120, 125 lb.	3.80 /	4.40
Molding and extrusion grades		
Nos. 150, 180 lb.	3.35 /	3.95
160, 167 lb.	2.90 /	3.50

Tackifiers

Bunarex 10, 25, 40 lb.	.053 /	.0625
Hercolyn lb.	.1122/	.1347
Koresin lb.	.40 /	.52
Nevillac lb.	.17 /	.19
Nevilloid C-55 lb.	.12	
Nevindene lb.	.105 /	.135
Piccolastic Tackifiers lb.	.20 /	.205
Piccolyte Resins lb.	.15 /	.185
Picoumaron Resin 427 lb.	.0625/	.1075
Staybelite Resin lb.	$0.06 /	$0.065
Synthetic 100 lb.	.41	
Synthol lb.	.225	
Ty-Ply Q, S gal.	6.75 /	8.00
Vistac No. 1 gal.	1.21 /	1.41
No. 2 gal.	1.61 /	1.75
Vistanex lb.	.32 /	.36

Vulcanizing Agents

Dibenzo G-M-F lb.	1.50	
Ethyl Selenac lb.	1.60	
Tuads lb.	1.25	
G-M-F lb.	1.95	
Litharge, commercial lb.	.0975/	.115
Eagle, sublimed lb.	.1025/	.1075
FBS lb.	.0975/	.115
Magnesia, Calcined		
Light, technical lb.	.25 /	.26
Heavy, technical lb.	.05 /	.1275
Extra light, U.S.P. lb.	.26	
Medium light, technical lb.	.12	
Methyl Selenac lb.	1.60	
Tuads lb.	1.25	
Red lead, commercial lb.	.1075/	.13
#2 RM lb.	.1125/	.13
Sulfur, commercial 100 lbs.	1.65 /	2.11
Crystex lb.	.32 /	.45
Dichloride lb.	.035 /	.1875
Insoluble 60 lb.	.16	
Monochloride lb.	.03 /	.1825
Rubbermakers, commercial 100 lbs.	1.35 /	2.05
Refined 100 lbs.	2.40	
Telloy lb.	1.75	
Vandex lb.	1.75	
Vultac Nos. 1, 2 lb.	.38 /	.45
No. 3 lb.	.42 /	.49
White lead silicate lb.	.073 /	.135
Eagle lb.	.12 /	.1325

Statement of India RUBBER WORLD

Statement of the ownership, management, circulation, etc., required by the Acts of Congress of August 24, 1912, and March 3, 1933, of INDIA RUBBER WORLD, published monthly at Orange, Conn., for October 1, 1946.

State of New York }
County of New York } ss.

Before me, a notary public in and for the State and County aforesaid personally appeared B. Brittain Wilson, who, having been duly sworn according to law, deposes and says that he is the Business Manager of INDIA RUBBER WORLD and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation) etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: publisher, Bill Brothers Publishing Corp., 386 Fourth Ave., New York 16, N. Y.; editor, Robert G. Seaman, 386 Fourth Ave., New York 16, N. Y.; managing editor, S. R. Hague, 386 Fourth Ave., New York 16, N. Y.; business manager, B. Brittain Wilson, 386 Fourth Ave., New York 16, N. Y.

2. That the owner is: Bill Brothers Publishing Corp., Caroline L. Bill, Raymond Bill, Edward Lyman Bill, Randolph Brown, all at 386 Fourth Ave., New York 16, N. Y.

3. That the known bondholders, mortgages, and other security holders owning or holding 1% or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholders and security holders appear upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

B. BRITTAIN WILSON
Business Manager

Sworn to and subscribed before me this 24th day of September, 1946.

[SEAL] WM. A. LOW.
Notary Public, Queens Co. No. 1562, Reg. No. 138-L-7. Certificate filed in N. Y. Co. No. 657, Reg. No. 338-L-7.
(Commission expires March 30, 1947)

Rims, Approved and Branded by The Tire & Rim Association, Inc.

RIM SIZE	AUG. 1946
15" & 16" D. C. Passenger	
16x4.00E	506,449
16x4.50E	250,127
15x5.00E	113,330
15x5.00F	9,839
16x5.00F	7,300
15x5.50F	70,725
16x5.50F	7,790
16x4.00E—Hump	237,434
15x4.50E—Hump	96,613
16x4.50E—Hump	5,646
15x5.00F—Hump	10,176
15x5—K	94,975
16x6—L	58,170
15x6—½—L	11,679
Flat Base Truck	
17x4.33R	21,905
20x4.33R	8,836
17x5.0	3,070
20x5.0	4,391
20x5.00S	352,356
20x6.00S	4,619
15x6.00T	2,928
20x6.0	3,001
20x6.00T	7,654
24x6.00T	2,833
15x7.00T	670
20x7.0	1,879
20x7.00T	31,046
24x7.00T	738
15x7.33V	549
20x7.33V	29,374
22x7.33V	18,162
20x8.37V	1,099
24x8.37V	991
Semi D. C. Truck	
15x5.50F	4,970
Tractor & Implement	
12x3.00D	8,391
15x3.00D	29,514
16x3.00D	6,041
19x3.00D	17,639
21x3.00D	2,851
17x3.25E	532
18x5.50F	8,162
20x5.50F	9,336
24x5.50R	5,776
20x8.00T	1,356
24x8.00T	4,696
36x8.00T	1,320
W9-28	3,265
W9-38	2,741
DW9-38	13,625
DW10-26	594
DW10-38	329
DW11-36	2,170
DW12-34	1,061
Earth Mover	
24x15.00	342
TOTAL	2,101,065

Foreign Trade Opportunities

(Continued from page 87)

Le Courroie Filastic, 29 bis Ave. Parmentier, Paris, France: industrial belting.

Einkaufsgenossenschaft der Schweiz — Coiffeurmeister, 51 Seilergraben, Zurich, Switzerland: hard rubber black combs.

Magazzini H. Neuber, di M. Tassinari & Co., 32 Via Strozzi, Florence, Italy: velvet elastic garters, gummed cotton-silk dress shields, all-elastic foundation garments and girdles of cotton and Lastex.

Emiliano Salcedo, of Salcedo Hermanos & Cia., Calle 13 No. 9-63, Bogota, Colombia: rubber druggists' sundries, tooth brushes, combs.

Alfred M. Bach, representing Adhesion Chemicals (Pty.) Ltd., P. O. Box 4004, 6 Pyott St., Port Elizabeth, South Africa: adhesives, chemicals for the footwear industry.

Elias Bajares-Lanza, representing Figallo, Bajares-Lanza & Cia., Marron a Dr. Paul 1, and Carlos Bousquet, Este 2 No. 61-A (Apartado 964), representing Stoik & Bousquet, all of Caracas, Venezuela: household goods, notions, novelties.

M. Lallemand, 412 Rue St. Leonard, Liege, Belgium: suspenders, garters, belts.

Henry Geneste, 11 Rue Rovigo, Algiers, Algeria: tires and tubes, industrial chemicals.

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Trojan Accumulators — E. Hickey, Trojan Works, Watford, Hertfordshire, England: porous rubber battery separators, hard rubber battery containers.

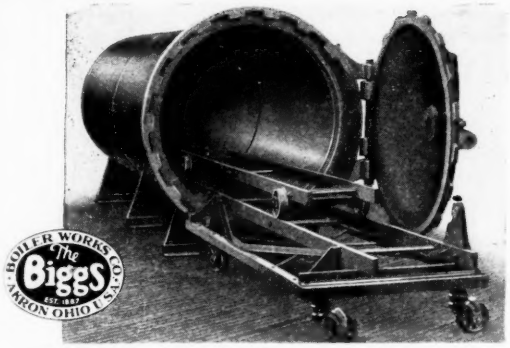

Fig. 18. Vulcanizer with inside car and outside transfer truck. Built to meet customers' requirements; all sizes.

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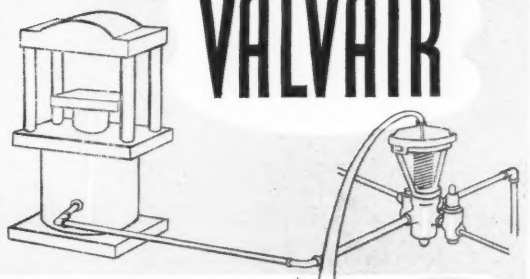
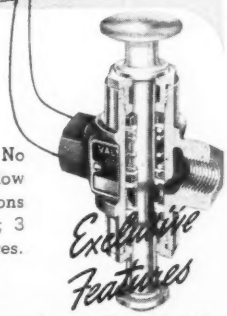


Diagram shows press operated by 2-pressure hydraulic valve with automatic H. P. inlet valve. Hydraulic valve controlled by Valvair knob-operated valve.



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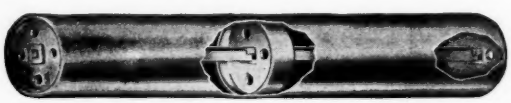

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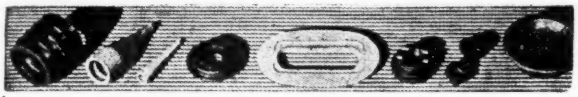

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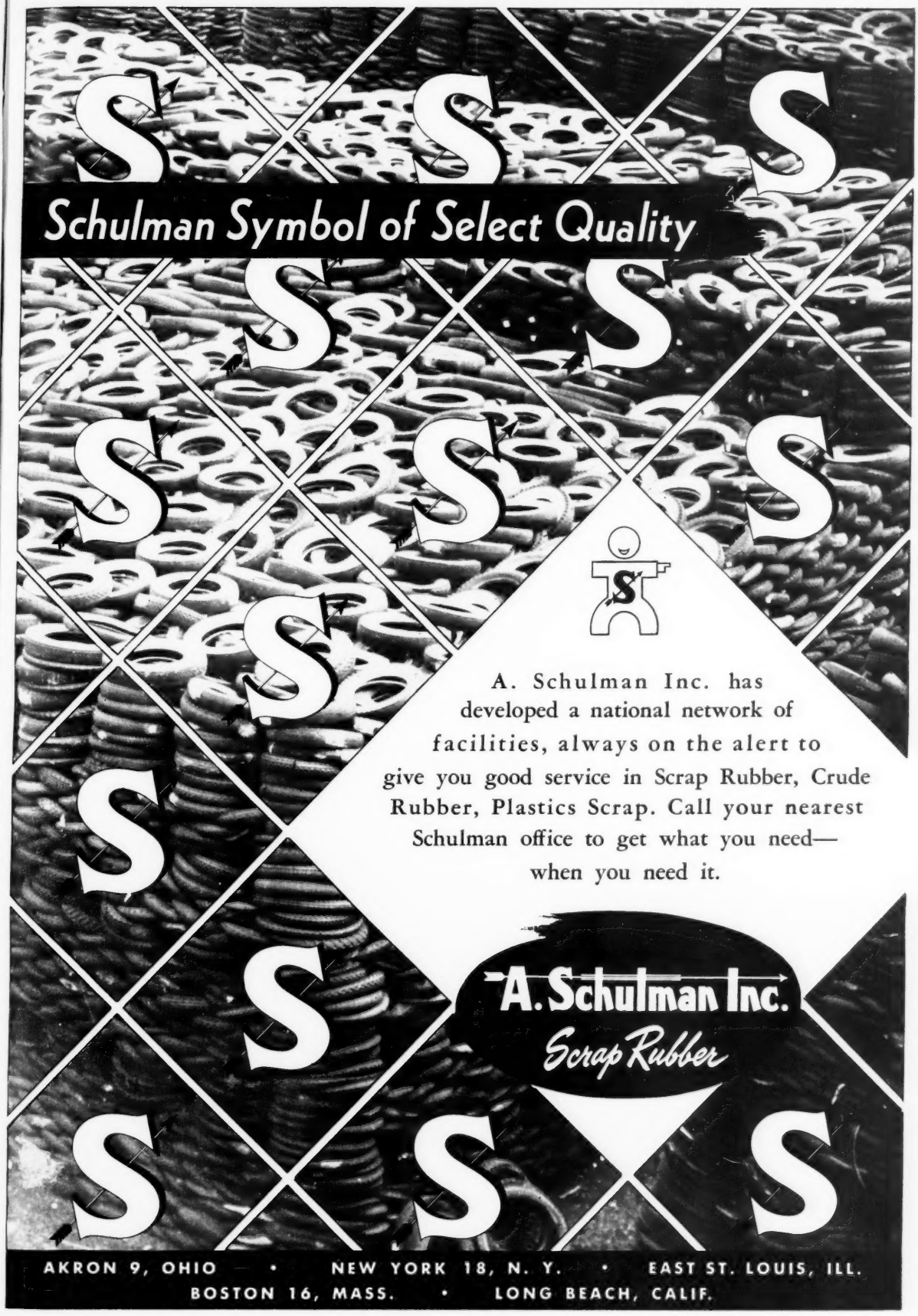
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